

Revision of the Neotropical types of *Megarthus* Curtis, 1829 and description of two new species from Costa Rica and Peru (Coleoptera, Staphylinidae, Proteininae)

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Revision of the Neotropical types of *Megarthus* Curtis, 1829 and description of two new species from Costa Rica and Peru (Coleoptera, Staphylinidae, Proteininae). - The nine *Megarthus* taxa hitherto described from the Neotropics are revised, and two new species are described from Costa Rica (*M. bierigi* sp. n.) and Peru (*M. machu* sp. n.). *Megarthus solitarius adelphus* Bierig is raised to species level (*M. adelphus* Bierig stat. nov.). Lectotypes are designated for *M. inaequalis* Bierig, *M. mammiger* Bierig, *M. mastiger* Bierig, *M. solitarius* Sharp, *M. solitarius adelphus* Bierig and *M. zunilensis* Sharp. These eleven species are described, and their diagnostic characters are figured. The diversity of the genus in the Neotropics is briefly discussed.

Keywords: Taxonomy - Mexico - Central America – South America - diversity.

INTRODUCTION

The subfamily Proteininae is a group of rove-beetles with a predilection for cool and moderate climates. It is distributed worldwide, with the notable exception of Madagascar, it currently contains 5 subtribes, 11 genera and 196 species. Four of these tribes (8 genera and 9 species) occur only in New Zealand, Australia, New Caledonia and southern Chile, while the fifth and most derived one (Proteinini) is distributed predominantly in the northern hemisphere. *Megarthus* Curtis, 1829, with some 139 species described, is by far the most diverse genus of the subfamily. It is also the only genus of Proteinini occurring south of the equator, where it is usually confined to montane habitats.

The presence of *Megarthus* in the Neotropics was for the first time reported by Sharp (1887), who described *M. solitarius* and *M. zunilensis*, from Guatemala. Bernhauer (1929) described *M. altivagans*, from Mexico. Later Bruch (1940) described the Argentinian *M. ogloblini*, and Bierig (1940) added five new taxa from Central America (i.e. *M. flavosignatus*, *M. inaequalis*, *M. mammiger*, *M. mastiger*, and *M. solitarius* var. *adelphus*). Except for a brief comment on the amazingly close phylogenetic relationships between *M. inaequalis* and the *M. auricola*-group from New Guinea (Cuccodoro, 1998), nothing has been published on the topic since. Their main

diagnostic features (i.e. genitalia and male secondary characters) have never been illustrated.

I have examined the primary types described from this region, and the species they represent are redescribed below. In addition, two new species are described: one collected by Bierig is from Costa Rica, and the second, from Peru, is the largest *Megarthus* currently known. These species are illustrated, and their presumed affinities are briefly discussed. They represent however not even the quarter of the species of Neotropical *Megarthus* I recognized in the collections examined (see section Discussion). The remaining new species and identification keys will be dealt with in separate papers.

MATERIAL AND METHODS

For detailed examination, specimens were dissected, cleared in 0.1 N potassium hydroxide and mounted in Canada balsam on acetate slides. Drawings were made using a drawing tube mounted on a compound microscope.

The term frons, as used in the present study, refers to the area anterior to the U-shaped impression, the vertex to the area behind. Abdominal sternites and tergites are counted from the first morphological segment.

I have examined over 800 Neotropical *Megarthus*. Only 67 specimens could be assigned to one of the nine species previously described. The label data of the types are reproduced verbatim between “ ”, with additional information pertaining to labels, or locality in []. A slash / separates different labels. New data are given in standard format, with major administrative units in English and names of collectors in ().

The material studied is deposited in the following collections: BMNH = Natural History Museum, London; CNCI = Canadian National Collection of Insects, Ottawa; FMNH = Field Museum of Natural History, Chicago; MHNG = Muséum d'histoire naturelle, Geneva; MLPA = Museo de La Plata, La Plata; SEMC = Snow Entomological Museum, Lawrence.

TAXONOMY

The species treated below all have the eyes strongly convex to hemispherical with the upper margin sinuate in dorsal view, the occipital ridge indistinct, the antennae with the scape not compressed and without patches of sensillae on the flabellum, the third maxillary palpomeres subcylindrical, the protochanters without transverse ridge, the metasternum with postmesocoxal ridge arcuate in the middle, and the elytral apical margin slightly arcuate or straight near suture, the latter weakly arcuate toward obtuse apical angle. In order to keep the text more concise, these features are not repeated in the descriptions below.

Megarthus adelphus Bierig **stat. nov.**

Figs 10, 12-20

Megarthus solitarius adelphus Bierig, 1940: 377.

TYPE MATERIAL: Lectotype (♀, in FMNH): “Carpintera, 6.viii.39. Costa Rica [hand-written] / Typus”. – Paralectotypes (2 ♀ ♀): same data as lectotype, but “Paratypus”, in FMNH, and MHNG by **present designation**.

DESCRIPTION: Habitus as in Fig. 10. Combined length of pronotum and elytra = 1.3-1.4 mm; maximal pronotal width = 0.9-1.1 mm. Body dark brown with appendages slightly paler; antennomeres 11 paler than antennomeres 1-10. Dorsal pubescence fairly uniform, denser on head and pronotum than on elytral disc; frontal setae directed forward; elytral and pronotal setae slightly arcuate, recumbent; metasternal pubescence fairly uniform, as long as or longer than that of prosternum; pubescence on abdominal tergites parallel, uniform; that on sternites IV-VII uniform. Frons, pronotum, elytra and anterior portion of prohypomera granulate; frontal granulation conspicuous, with granula about as high as their diameter, or higher; metasternum with granulofossulation becoming denser and finer posteriomedially.

Frons forming above clypeus a sharp ridge, the latter finely carinate, evenly arcuate in dorsal view; mesal portion of disc strongly evenly convex in lateral view; U-shaped frontal impression deep in middle, shallow laterally. Temples strongly convex in dorsal view. Antennae (Fig. 12) 2.3-2.5 times as long as pronotum.

Pronotum (Fig. 19) with center strongly convex in frontal view; disc deeply depressed near middle of lateral edges, shallowly depressed along anterior margin, posterior margin and posterior portion of medial groove; the latter slightly arcuate in lateral view, deep, parallel-sided; hypomera ridged from anterior margin to laterobasal angle, with a discal pit. Prosternal medial ridge absent. Scutellum with anterior margin rounded, posterior margin slightly arcuate toward acutely angular apex.

Elytra gradually widened (Fig. 10); humeral callus low, moderately convex; disc with low swellings, moderately depressed posteriorly along lateral edge; the latter finely carinate, indistinctly denticulate, slightly arcuate in dorsal view.

Abdominal sternites II and III with medial processes as in Fig. 20, posterior portion of process of sternite III trifid.

Male: Unknown.

Female: Abdominal tergite VIII (Figs 16, 17) lacking medioapical projection. Sternite VIII as in Fig. 18. Genital segments as in Figs 13-15; gonocoxal plate bearing a mediodorsal ridge.

DISTRIBUTION AND NATURAL HISTORY: The species is known only from Costa Rica. According to the original description, the types were collected by A. Bierig at 1800 m from sifted leaf litter near a fallen tree in a forest (together with the holotype of *M. flavosignatus*).

COMMENTS: *Megarthus adelphus*, *M. bierigi*, *M. inaequalis*, *M. machu* and *M. mastiger* share a laterobasally broadly notched pronotum. Among these species, *M. adelphus* is easily distinguished the lateral contour of its pronotum forming four denticles.

Megarthus altivagans Bernhauer, 1929

Figs 1, 21-38

Megarthus altivagans Bernhauer, 1929: 187.

TYPE MATERIAL: Holotype (♀, in FMNH): "Mex. Desierto de los Leones, 20.vii.24, Dampf [handwritten] [handwritten underneath the card: esiero Leones 23. Dampf] / wald. 3-4000m, in rotgelbem Blätterpilz. [handwritten] / un. F. 247 Desierto 20/vii.24, rotgelbem Blätterpilz [handwritten] / *Megarthus altivagans* Brnh. Typus unic [handwritten]".

ADDITIONAL MATERIAL: MEXICO, Jalisco, E slope of Nevado de Colima, 19mi W Alenquique <103°36'W; 19°32'N> ca. 3000m, 20-21.ix.1973 (Newton) 547Cs, #73-1125, ex

squid carrion trap in *Alnus* woodland, 1 ♂ in FMNH and 1 ♀ in MHNG; same data, but ca. 2400m, 21.ix.1973, berlese, ex mixed hardwood pine forest, 1 ♀ in FMNH; same data, but 21-22.ix.1973, on gilled mushrooms, 1 ♀ in FMNH. – Mexico, Volc. Popocatépetl, Km 10, ca. 3000m, 9.v.1971 (Campbell), 1 ♂ in CNCI.

DESCRIPTION: Habitus as in Fig. 1. Combined length of pronotum and elytra = 1.4-1.7 mm; maximal pronotal width = 0.9-1.1 mm. Body dark brown with appendages slightly paler. Dorsal pubescence uniform; medial frontal directed backward; elytral and pronotal pubescence slightly arcuate, recumbent; metasternal pubescence becoming sparser posteriomedially and longer anteriorly, shorter than prosternal pubescence; pubescence on abdominal tergites parallel, uniform. Frons and anterior portion of prohypomera granulate; frontal granulation fine, with granula lower than half of their diameter. Pronotum, elytra and lateral portions of metasternum granulo-fossulate; posteriomedial portion of metasternum impunctate.

Frons forming above clypeus a sharp ridge, the latter not carinate; mesal portion of disc weakly evenly convex in lateral view; U-shaped frontal impression shallow. Temples nearly flat in dorsal view. Antennae (Fig. 30) 1.9-2.1 times longer than pronotum.

Pronotum (Fig. 37) with center moderately convex in frontal view; disc shallowly depressed along lateral edges; medial groove nearly straight in lateral view, shallow, parallel-sided; hypomera without discal ridge, nor pit. Prosternal medial ridge absent. Scutellum with anterior margin fairly right-angled in middle and posterior margin slightly arcuate toward acutely angular apex.

Elytra gradually widened (Fig. 1); humeral callus obsolete; disc with very low swellings, nearly flat posteriorly along lateral edge; the latter finely carinate, finely denticulate, nearly straight in dorsal view.

Abdominal sternites II and III with medial processes as in Fig. 38, posterior portion of process of sternite III straight.

Male: Anterior frontal edge raised in middle, horn-like. Protarsomeres 1 bearing tenent setae. Metafemora about as long as mesofemora (Fig. 29). Metatibiae (Fig. 23) longer than mesotibiae (Fig. 24). Metatarsomeres 1 shorter than combined length of metatarsomeres 2-4. Peg-like setae arranged in a double row on mesotrochanters (Fig. 29) and mesotibiae, in a single row on metatibiae, and absent from pro-trochanters, profemora, protibiae, mesofemora, metatrochanters and metafemora. Pubescence on sternites IV-VII becoming denser posteriomedially. Apex of abdominal tergite VIII as in Figs 27-28. Sternite VIII as in Fig. 26. Hemitergites IX as in Fig. 25. Sternite IX lacking subbasal protuberance. Aedeagus as in Figs 21-22.

Female: Anterior frontal edge evenly arcuate in dorsal view. Abdominal tergite VIII (Figs 35-36) lacking medioapical projection. Pubescence on sternites IV-VII uniform, except for a pair of subapical macrosetae on each sternite. Sternite VIII as in Fig. 34. Genital segments as in Figs 31-33; gonocoxal plate lacking mediodorsal ridge.

DISTRIBUTION AND NATURAL HISTORY: The species is from Mexico, where it occurs in the vicinity of Mexico city (Parque Nacional Desierto de Los Leones and Parque Nacional Ixtaccihualtl-Popocatépetl) and about 450 km west in the Parque Nacional Nevado de Colima. *Megarhtrus altivaigans* has been collected in mixed hardwood pine forests and *Alnus* woodlands at elevations ranging from 2400-4000 m by

sifting forest litter, in gilled mushrooms, and using squid carrion traps. Two large oval eggs (0.8 x 0.3 mm) were found in the abdomen of the holotype.

COMMENTS: *Megarthus altivagans* is so far the only Neotropical *Megarthus* having the frontal setae directed backward and bearing adhesive setae on the first protarsomeres in the male. Also, the medially raised, horn-like frontal margin in the male is distinctive. It strongly resembles *M. ashei* Cuccodoro & Löbl, 1996, from the Rocky Mountains of Arizona and New Mexico, which has a slightly different aedeagus and the frons unmodified in the male.

***Megarthus bierigi* sp. n.**

Figs 7, 39-56

TYPE MATERIAL: Holotype (♂, in SEMC): COSTA RICA, Puntarenas, Monteverde Biol. Res., trail near lab, 1550m, 21-22.v.1993 (Michalski) ex flight intercept trap. – Paratypes (13): same data as holotype, 2 ♀♀ in MHNG and SEMC; same data, but 26-28.v.1993, 2 ♀♀ in SEMC. – Same data, but 1-2.vi.1993, 2 ♂♂ in SEMC and 1 ♂ in MHNG. – Same data, but 1620m, 25.vi.1990 (Roberts) ex flight intercept trap, 1 ♀ in MHNG. – COSTA RICA, Alajuela, Peñas Blancas, 1420m, 20.v.1989 (Ashe, Leschen & Brooks) #274, ex flight intercept trap, 1 ♂ in SEMC. – San Isidro, La Estrella, 16.x.1941 (Bierig) 1 ♂ and 3 ♀♀ in FMNH [mislabelled types of *M. inaequalis* Bierig].

DESCRIPTION: Habitus as in Fig. 7. Combined length of pronotum and elytra = 1.3-1.4 mm; maximal pronotal width = 0.9-1.1 mm. Body dark brown with appendages slightly paler; antennomeres 11 paler than antennomeres 1-10. Dorsal pubescence fairly uniform, denser on head and pronotum than on elytral disc; frontal setae directed forward; elytral and pronotal setae slightly arcuate, recumbent; metasternal pubescence fairly uniform, as long as or longer than that of prosternum; pubescence on abdominal tergites parallel, uniform; that on sternites IV-VII uniform. Frons, pronotum, elytra and anterior portion of prohypomera granulate; frontal granulation conspicuous, with granula about as high as their diameter, or higher; metasternum with granulofossulation becoming denser and finer posteriomedially.

Frons forming above clypeus a sharp ridge, the latter finely carinate, weakly arcuate in middle and laterally oblique in dorsal view; mesal portion of disc strongly evenly convex in lateral view; U-shaped frontal impression deep in middle, shallow laterally. Temples strongly convex in dorsal view. Antennae (Fig. 51) 2.3-2.5 times longer than pronotum.

Pronotum (Fig. 56) with center strongly convex in frontal view; disc deeply depressed near middle of lateral edges, shallowly depressed along anterior margin, posterior margin and posterior portion of medial groove; the latter slightly arcuate in lateral view, deep, parallel-sided; hypomera ridged from anterior margin to laterobasal angle, with a discal pit. Prosternal medial ridge absent. Scutellum with anterior margin rounded and posterior margin slightly arcuate toward acutely angular apex.

Elytra gradually widened (Fig. 7); humeral callus raised, forming a blunt longitudinal ridge; disc with low swellings, moderately depressed posteriorly along lateral edges; the latter finely carinate, indistinctly denticulate, slightly arcuate in dorsal view.

Abdominal sternites 2 and 3 with medial processes as in Fig. 54, posterior portion of process of sternite 3 widened.

Male: Frontoclypeal area not modified. Protarsomeres 1 lacking tenent setae. Mesofemora (Fig. 43) as long as metafemora (Fig. 45). Mesotibiae (Fig. 42) shorter

than metatibiae (Fig. 43). Metatarsomeres 1 about as long as combined length of metatarsomeres 2-4. Peg-like setae arranged in a single row on mesotrochanters (Fig. 43), grouped in a field on mesotibiae and metatibiae, and absent from pro-trochanters, profemora, protibiae, mesofemora, metatrochanters and metafemora. Apex of abdominal tergite VIII as in Figs 44, 47. Sternite VIII as in Fig. 46. Sternite IX lacking subbasal protuberance. Aedeagus as in Figs 39, 40.

Female: Abdominal tergite 8 (Figs 53, 55) lacking a medioapical projection. Sternite VIII as in Fig. 52. Genital segments as in Figs 48-50; gonocoxal plate bearing a mediodorsal ridge.

ETYMOLOGY: The species is named after its first collector, Alejandro A. Bierig, San Pedro de Montes de Oca.

DISTRIBUTION AND NATURAL HISTORY: The species is apparently restricted to Costa Rica, where it was collected at elevations ranging from 1400-1600 m using flight intercept traps.

COMMENTS: From the Neotropical *Megarthus* possessing a conspicuous humeral callus (*M. bierigi*, *M. inaequalis* and *M. mammiger*), *M. bierigi* can be easily distinguished by its lack of elytral discal humps. See comments under *M. adelphus*.

***Megarthus flavosignatus* Bierig, 1940**

Figs 5, 57-68

Megarthus flavosignatus Bierig, 1940: 378.

TYPE MATERIAL: Holotype (♂, in FMNH): "Carpintera, 6.viii.39, Costa Rica [hand-written] | Typus".

ADDITIONAL MATERIAL: Same data as holotype, but 16.vi.1940, 1 ♂ in MHNG.

DESCRIPTION: Habitus as in Fig. 5. Combined length of pronotum and elytra = 1.3-1.4 mm; maximal pronotal width = 0.9-1.1 mm. Body dark brown with appendages slightly paler; antennomeres 10-11 paler than antennomeres 1-9. Dorsal pubescence denser on head and pronotum than on elytral disc, becoming denser along medial groove of pronotum and on anterior portion of elytral disc; frontal setae directed forward; elytral and pronotal setae slightly arcuate, recumbent; metasternal pubescence becoming denser anteriorly and medially, as long as or longer than that of prosternum; pubescence on abdominal tergites parallel, uniform; that on sternites IV-VIII uniform. Frons, pronotum, lateral portion of elytral disc and anterior portion of prohypomera granulate; frontal granulation conspicuous, with granula about as high as their diameter, or higher; central, adsutural and posterior area of elytral disc punctate, coarsely; metasternum coarsely granulofossulate.

Frons forming above clypeus a sharp ridge, the latter finely evenly carinate, nearly straight in middle and laterally oblique in dorsal view; mesal portion of disc strongly evenly convex in lateral view; U-shaped frontal impression shallow. Temples strongly convex in dorsal view. Antennae (Fig. 61) 2.1-2.3 times longer than pronotum.

Pronotum (Fig. 68) with center strongly convex in frontal view; disc deeply depressed near middle of lateral edges, shallowly depressed along anterior and posterior margins; medial groove slightly arcuate in lateral view, deep, narrowed in middle; hypomera ridged from anterior margin to laterobasal angle, disc without pit. Prosternal medial ridge absent, or absent. Scutellum with anterior margin rounded and posterior margin slightly arcuate toward right-angled apex.

Elytra gradually widened (Fig. 5); humeral callus low, moderately convex; disc with low swellings, moderately depressed posteriorly along lateral edges; the latter very finely carinate, finely denticulate, slightly sinuate in dorsal view.

Abdominal sternites II and III with medial processes as in Fig. 66, posterior portion of process of sternite III straight.

Male: Frontoclypeal area not modified. Protarsomeres 1 lacking tenent setae. Mesofemora (Fig. 62) as long as metafemora. Mesotibiae (Fig. 60) shorter than metatibia (Fig. 59). Metatarsomere 1 about as long as combined length of metatarsomeres 2-4. Peg-like setae arranged in a single row on mesotrochanters (Fig. 62) and mesotibiae, arranged in double row on metatibiae, and absent from protrochanters, profemora, protibiae, mesofemora, metatrochanters and metafemora. Apex of abdominal tergite VIII as in Figs 63, 67. Sternite 8 as in Figs 64-65. Sternite IX lacking subbasal protuberance. Aedeagus as in Figs 57-58.

Female: Unknown.

DISTRIBUTION AND NATURAL HISTORY: The species is known only from the type locality in Costa Rica. According to the original description, A. Bierig collected the holotype at 1800 m from sifted leaf litter of a fallen tree in forest (together with the types of *M. adelphus*).

COMMENTS: The male abdominal sternite VIII with a pair of projecting tips of *M. flavosignatus* is particularly notable. This feature is shared only with *M. zunilensis*, which has different male sexual characters. See comments under *M. zunilensis*.

Megarthus inaequalis Bierig, 1940

Figs 8, 69-86

Megarthus inaequalis Bierig, 1940: 379.

TYPE MATERIAL: Lectotype (♂, in FMNH): "Vara Blanca, viii.38, Costa Rica [hand-written] / Typus". - Paralectotypes (2): same data as lectotype, but "Paratypus", 1 ♂ in MHNG and 1 ♀ in FMNH, **by present designation**.

ADDITIONAL MATERIAL: COSTA RICA, Puntarenas, Monteverde Biol. Res., trail near lab, 1550m, 21-22.v.1993 (Michalski) ex flight intercept trap, 1 ♂ and 1 ♀ in SEMC; same data, but 25.v.1993, 2 ♀♀ in MHNG and SEMC; same data, but 26-28.v.1993, 2 ♀♀ in MHNG and SEMC; same data, but 30.v.1993, 1 ♀ in SEMC; same data, but near Quebrada cuecha, on Sendero Rio, 1580m, 13.v.1989 (Ashe, Leschen & Brooks) #163, ex *Xylaria*, 1 ♀ in SEMC; same data, but 1500m, 1-4.vi.1979 (Campbell) 1 ♂ in CNCI.

DESCRIPTION. Habitus as in Fig. 8. Combined length of pronotum and elytra = 1.3-1.5 mm; maximal pronotal width = 0.9-1.0 mm. Body dark brown with appendages slightly paler; antennomeres 10-11 paler than antennomeres 1-9. Dorsal pubescence fairly uniform, denser on head and pronotum than on elytral disc; frontal setae directed forward; elytral and pronotal setae slightly arcuate, semi-erect; metasternal pubescence becoming denser posteriomedially, as long as or longer than that of prosternum; pubescence on abdominal tergites parallel, uniform; that on sternites 4-7 uniform. Frons, pronotum, elytra and anterior portion of prohypomera granulate; frontal granulation conspicuous, with granula about as high as their diameter, or higher; metasternum with granulofossulation becoming finer posteriomedially.

Frons forming above clypeus a sharp ridge, the latter finely evenly carinate, weakly arcuate in middle and laterally oblique in dorsal view; mesal portion of disc

slightly evenly convex in lateral view; U-shaped frontal impression in middle deep, shallow laterally. Temples strongly convex in dorsal view. Antennae (Fig. 78) 2.1-2.3 times longer than pronotum.

Pronotum (Fig. 85) with center strongly convex in frontal view; disc deeply depressed near middle of lateral edges, shallowly depressed along anterior and posterior margins; medial groove slightly arcuate in lateral view, deep, parallel-sided; hypomera ridged from anterior margin to laterobasal angle, with a discal pit. Prosternal medial ridge present anteriorly, fine. Scutellum with anterior margin rounded and posterior margin slightly arcuate toward acutely angular apex.

Elytra gradually widened (Fig. 8); humeral callus raised, forming a blunt longitudinal ridge; disc with low anterior adsutural hump and conspicuous posterior adsutural hump, shallowly depressed posteriorly along lateral edges; the latter very finely carinate, moderately denticulate, slightly arcuate in dorsal view.

Abdominal sternites II and III with medial processes as in Fig. 86, posterior portion of process of sternite III widened.

Male: Frontoclypeal area not modified. Protarsomeres 1 lacking tenent setae. Mesofemora (Fig. 77) as long as metafemora. Mesotibiae (Fig. 72) shorter than metatibiae (Fig. 71). Metatarsomeres 1 about as long as combined length of metatarsomeres 2-4. Peg-like setae arranged in a single row on metatibia, grouped in a field on mesotrochanters (Fig. 77) and mesotibiae, and absent from protrochanters, profemora, protibiae, mesofemora, metatrochanters and metafemora. Apex of abdominal tergite VIII as in Figs 73, 75, 76. Sternite VIII as in Fig. 74. Sternite IX lacking subbasal protuberance. Aedeagus as in Figs 69, 70.

Female: Abdominal tergite VIII (Figs 83-84) lacking medioapical projection. Sternite VIII as in Fig. 82. Genital segments as in Figs 79-81; gonocoxal plate bearing a mediodorsal ridge.

DISTRIBUTION AND NATURAL HISTORY: The species is apparently restricted to Costa Rica, at elevations ranging between 1500-1800 m. According to the original description, A. Bierig collected the types in shrubs bordering a primary forest at an elevation of 1800 m between Volcanoes Barba and Poás. Additional specimens were collected in *Xylaria* (fungi) or using flight intercept traps.

COMMENTS: *Megarthus inaequalis* and *M. mammiger* are the only Neotropical members of the genus bearing conspicuous posterior adsutural humps. These two species can be easily distinguished by the shape of the pronotum, which is broadly notched laterobasally only in *M. inaequalis*. The diagnostic shape of the male abdominal tergite VIII of *M. inaequalis* is also particularly notable. See comments under *M. adelphus* and *M. bierigi*.

Megarthus machu sp. n.

Figs 11, 87-104

TYPE MATERIAL: Holotype (♂, in SEMC): PERU, Cuzco Dept., Pillahuata, Manu Rd., Km 128, 27.ix.1982 (Watrous & Mazurek) #82-308, ex vine litter. – Paratypes (4): same data as holotype, 1 ♀ in FMNH; same data, but 26.ix.1982, #82-301, 2 ♀♀ in FMNH and MHNG; same data, but 25.ix.1982, #82-290, on tent, 1 ♀ in FMNH.

DESCRIPTION: Habitus as in Fig. 11. Combined length of pronotum and elytra = 2.1-2.3 mm; maximal pronotal width = 1.5-1.6 mm. Body dark brown with appendages

and elytra slightly paler; antennomeres 10-11 paler than antennomeres 1-9. Dorsal pubescence fairly uniform, denser on head and pronotum than on elytral disc; frontal setae directed forward; elytral and pronotal setae fairly straight, recumbent; metasternal pubescence fairly uniform, shorter than prosternal; pubescence on abdominal tergites parallel, becoming denser near posterior margin of tergite VII. Frons, humeral callus of elytra and anterior portion of prohypomera granulate; frontal granulation conspicuous, with granula about as high as their diameter, or higher; pronotum granulofossulate; metasternum with granulofossulation becoming denser and finer posteriomedially; elytral disc coarsely punctate.

Frons forming above clypeus a sharp ridge, the latter finely evenly carinate, weakly arcuate in middle and laterally oblique in dorsal view; mesal portion of disc strongly evenly convex lateral view; U-shaped frontal impression deep. Temples strongly convex in dorsal view. Antennae (Fig. 98) 2.3-2.6 times longer than pronotum.

Pronotum (Fig. 97) with center strongly convex in frontal view; disc deeply depressed near middle of lateral edge, shallowly depressed along anterior and posterior margins; medial groove slightly arcuate in lateral view, deep, parallel-sided; hypomera ridged from anterior margin to laterobasal angle, disc without pit. Prosternal medial ridge entire. Scutellum with anterior margin angulate in middle and posterior margin slightly arcuate toward obtusely angular apex.

Elytra abruptly widened subbasally (Fig. 11); humeral callus low, moderately convex; disc with low swellings, deeply depressed along lateral edge; the latter finely carinate, markedly denticulate, strongly arcuate in dorsal view.

Abdominal sternites II and III with medial processes as in Fig. 96, posterior portion of process of sternite III widened, or trifid.

Male: Frontoclypeal area not modified. Protarsomeres 1 lacking tenent setae. Mesofemora (Fig. 90) as long as metafemora (Fig. 89). Mesotibiae (Fig. 94) shorter than metatibiae (Fig. 95). Metatarsomeres 1 about as long as combined length of metatarsomeres 2-4. Peg-like setae arranged in a single row on mesotrochanters (Fig. 90), grouped in a field on mesotibiae and metatibiae, and absent from pro-trochanters, profemora, protibiae, mesofemora, metatrochanters (Fig. 89) and metafemora. Pubescence on sternites IV-VII becoming denser posteriomedially. Apex of abdominal tergite VIII as in Figs 91, 93. Sternite VIII as in Fig. 92. Sternite IX lacking subbasal protuberance. Aedeagus as in Figs 87-88.

Female: Pubescence on sternites IV-VII uniform, except for a pair of subapical macrosetae on each sternite. Abdominal tergite VIII (Figs 102-103) without medio-apical projection. Sternite VIII as in Fig. 104. Genital segment as in Figs 99-101; gonocoxal plate bearing a mediodorsal ridge.

DISTRIBUTION AND NATURAL HISTORY: *Megarthurus machu* is known only from the type locality in Peru (Pillahuata <3° 7' S; 71° 25' W>), which is situated at an elevation of nearly 2500 m just below a patch of forest. It was found in vine leaf litter, and showed good ability to fly (one specimen was found on a tent).

COMMENTS: Within Neotropical *Megarthurus*, *M. machu* is easily distinguished by its abruptly and broadly expanded elytra. Exceeding 4 mm in length (when measured from the middle of the frontal margin to the tip of the abdomen), it is the largest species of Proteininae of the world. See comments under *M. adelphus*.

Megarthus mammiger Bierig, 1940

Figs 2, 105-123

Megarthus mammiger Bierig, 1940: 375.

TYPE MATERIAL: Lectotype (♂, in FMNH): "Vara Blanca, viii.38, Costa Rica [hand-written] / Typus". – Paralectotype (1 ♀, in FMNH): same data as lectotype, but "Paratypus", **by present designation.**

ADDITIONAL MATERIAL: COSTA RICA, Hwy #2, km 93 <83°45'W; 9°36'N> 3200m, iv.1985 (Goulet & Masner), 1 ♂ in CNCI. – Puntarenas, Monte Verde, Cerro Amigos, 1780m, 21.v.1989 (Ashe, Brooks & Leschen) flight intercept trap, #315, 1 ♂ and 1 ♀ in SEMC. – Volc. Irazú, 2800m, 18.i.1940 (Bierig), 1 ♂ in MHNG. – El Jardíú, ca. 3000m, 19.v.1944 (Bierig), 1 ♂ in FMNH. – San Isidro de il Tajar, ca. 1500m, 19.v.1944 (Bierig), 1 ♀ in MHNG.

DESCRIPTION: Habitus as in Fig. 2. Combined length of pronotum and elytra = 1.8-1.9 mm; maximal pronotal width = 1.3 mm. Body dark brown with appendages and elytra slightly paler; antennomeres 10-11 paler than antennomeres 1-9. Dorsal pubescence fairly uniform, denser on head and pronotum than on elytral disc; frontal setae directed forward; elytral and pronotal setae fairly straight, recumbent; metasternal pubescence fairly uniform, shorter than prosternal; pubescence on abdominal tergites parallel, uniform. Frons, anterior portion of prohypomera, humeral callus and lateral area of elytral disc granulate; frontal granulation inconspicuous, with granula about as high as half of their diameter; pronotum granulofossulate; metasternum with granulofossulation becoming finer posteriomedially; adsutural half of elytral disc punctate.

Frons forming above clypeus a sharp ridge, the latter finely evenly carinate, weakly arcuate in middle and laterally oblique in dorsal view; mesal portion of disc strongly evenly convex in lateral view; U-shaped frontal impression deep in middle, shallow laterally. Temples strongly convex in dorsal view. Antennae (Fig. 115) 2.3-2.6 times longer than pronotum.

Pronotum (Fig. 123) with center strongly convex in frontal view; disc deeply depressed near middle of lateral edges, shallowly depressed along anterior and posterior margins; medial groove nearly straight in lateral view, deep, somewhat narrowed in middle; hypomera ridged from anterior margin to laterobasal angle, disc without pit. Prosternal medial ridge absent. Scutellum with anterior margin angulate in middle and posterior margin slightly arcuate toward right-angled apex.

Elytra gradually widened (Fig. 2); humeral callus raised, forming a blunt longitudinal ridge; disc with low anterior and posterior adsutural humps, moderately depressed posteriorly along lateral edge; the latter finely carinate, finely denticulate, nearly straight in dorsal view.

Abdominal sternites II and III with medial processes as in Fig. 120, posterior portion of process of sternite III trifold.

Male: Frontoclypeal area not modified. Protarsomeres 1 lacking tenent setae. Mesofemora (Fig. 111) as long as metafemora (Fig. 110). Mesotibiae (Fig. 107) shorter than metatibiae (Fig. 108). Metatarsomeres 1 about as long as combined length of metatarsomeres 2-4. Peg-like setae arranged in a single row on mesotrochanters (Fig. 111), mesotibiae and metatibiae, absent from protrochanters, profemora, protibiae, mesofemora, metatrochanters metatrochanter (Figs 109-110) and metafemora; metatrochanters with a projecting process. Pubescence on sternites IV-VII becoming denser posteriomedially. Apex of abdominal tergite VIII as in Figs 113, 114. Sternite VIII as in Fig. 112. Sternite IX lacking subbasal protuberance. Aedeagus as in Figs 105-106.

Female: Pubescence on sternites IV-VII uniform, except for a pair of subapical macrosetae on each sternite. Abdominal tergite VIII (Figs 121-122) without medio-apical projection. Sternite VIII as in Fig. 119. Genital segments as in Figs 116-118; gonocoxal plate bearing a mediodorsal ridge.

DISTRIBUTION AND NATURAL HISTORY: The species is known only from Costa Rica, where it was found at elevations ranging from 1500-3200 m. According to the original description, A. Bierig collected the types between the Volcanoes Barba and Poás, at 1800 m in cow dung and in dead bamboo leaves.

COMMENTS: Among the Neotropical *Megarthus* possessing a conspicuous humeral callus (see comments under *M. bierigi*), *M. mammiger* can be easily recognised by its laterobasally shallowly emarginated pronotum. See also comments under *M. inaequalis* and *M. mastiger*.

Megarthus mastiger Bierig, 1940

Figs 9, 124-142

Megarthus mastiger Bierig, 1940: 376.

TYPE MATERIAL: Lectotype (♂, in FMNH): "Vara Blanca, viii.38, Costa Rica [hand-written]". Paralectotypes (4): Same data as lectotype, 2 ♂♂ and 2 ♀♀ in FMNH and MHNG, by present designation.

ADDITIONAL MATERIAL: COSTA RICA, Puntarenas, Monte Verde, 1520m, 14.v.1989 (Ashe, Brooks & Leschen) flight intercept traps, #177, 1 ♀ in SEMC.

DESCRIPTION: Habitus as in Fig. 9. Combined length of pronotum and elytra = 1.5-1.7 mm; maximal pronotal width = 1.0-1.1 mm. Body dark brown with appendages slightly paler; antennomeres 10-11 paler than antennomeres 1-9. Dorsal pubescence uniform; frontal setae directed forward; elytral and pronotal setae fairly straight, recumbent; metasternal pubescence uniform, shorter than prosternal; pubescence on abdominal tergites parallel, uniform; that on sternites IV-VII uniform, except for a pair of subapical macrosetae setae on each sternite. Frons, pronotum, elytra and anterior portion of prohypomera granulate; frontal granulation inconspicuous, with granula about as high as half of their diameter, or higher; pronotum granulofossulate; metasternum with granulofossulation becoming finer posteriomedially.

Frons forming above clypeus a sharp ridge, the latter finely evenly carinate, evenly arcuate in dorsal view; mesal portion of disc strongly evenly convex in lateral view; U-shaped frontal impression deep in middle, shallow laterally. Temples strongly convex in dorsal view. Antennae (Fig. 137) 2.2-2.4 times longer than pronotum.

Pronotum (Fig. 141) with center moderately convex in frontal view; disc deeply depressed near middle of lateral edges, shallowly depressed along anterior margin, posterior margin and posterior portion of medial groove; the latter nearly straight in lateral view, deep, parallel-sided; hypomera ridged from anterior margin to laterobasal angle, with a discal pit. Prosternal medial ridge absent. Scutellum with anterior margin subangulate in middle and posterior margin strongly arcuate toward obtusely angled apex.

Elytra gradually widened (Fig. 9); humeral callus low, moderately convex; disc with low adscutellar hump, shallowly depressed posteriorly along lateral edge; the latter finely carinate, finely denticulate, somewhat sinuate in dorsal view.

Abdominal sternites II and III with medial processes as in Fig. 142, posterior portion of process of sternite III straight.

Male: Frontoclypeal area not modified. Protarsomeres 1 lacking tenent setae. Mesofemora (Fig. 128) shorter than metafemora (Fig. 130). Mesotibiae (Fig. 127) shorter than metatibiae (Fig. 126). Metatarsomeres 1 somewhat shorter than combined length of metatarsomeres 2-4. Peg-like setae arranged in a single row on mesotrochanters (Fig. 128), grouped in a field on mesotibiae and metatibiae, and absent from protrochanters, profemora, protibiae, mesofemora, metatrochanters (Figs 130, 133) and metafemora. Apex of abdominal tergite VIII as in Figs 129, 131. Sternite VIII as in Fig. 132. Sternite IX lacking subbasal protuberance. Aedeagus as in Figs 124-125.

Female: Abdominal tergite VIII (Figs 139-140) lacking a medioapical projection. Sternite VIII as in Fig. 138. Genital segments as in Figs 134-136; gonocoxal plate lacking a mediodorsal ridge.

DISTRIBUTION AND NATURAL HISTORY: The species is known only from Costa Rica, where it was found at elevations ranging between 1500 and 1800 m. According to the original description, A. Bierig collected the types between the Volcanoes Barba and Poás, at 1800 m in cow dung and decaying leaves of shrubs at forest margins.

COMMENTS: The species differs from all the other Neotropical *Megarthus* by the particularly narrow mediobasal projection of the abdominal sternite VIII. The presence of a small projecting process on the metatrochanter in the male is only shared with *M. mammiger*, which differs notably from *M. mastiger* by the lateral contour of the pronotum, and by the presence on the female of a mediodorsal ridge on the gonocoxal plate. See comments under *M. adelphus*.

Megarthus ogloblini Bruch, 1940

Figs 4, 143-153

Megarthus ogloblini Bruch, 1940: 113.

TYPE MATERIAL: Holotype (♂, in MLPA): "Loreto, Misiones, Rep. Argentina, Dr. A.A. Ogloblin [typewritten], 15.v.1934 [handwritten underneath the label] / *Megarthus ogloblini* Bruch [handwritten], C. Bruch determ. 1939 [typewritten] / Museo La Plata [typewritten] / Typus ! [handwritten]".

DESCRIPTION: Habitus as in Fig. 4. Combined length of pronotum and elytra = 1.5 mm; maximal pronotal width = 1.0 mm. Body dark brown with appendages somewhat paler; antennomeres 10-11 slightly paler than antennomeres 1-9. Dorsal pubescence fairly uniform, denser near lateral margin of elytra and somewhat longer anteriomedially on pronotum; frontal setae directed forward; elytral and pronotal setae slightly arcuate, recumbent; metasternal pubescence uniform, as long as or longer than that of prosternum; pubescence on abdominal tergites parallel; that on sternites IV-VII uniform. Frons, pronotum, elytra and anterior portion of prohypomera granulate; frontal granulation conspicuous, with granula about as high as their diameter, or higher; metasternum with granulofossulation becoming denser and finer posteriomedially.

Frons forming above clypeus a sharp ridge finely evenly carinate, the latter evenly arcuate in dorsal view; mesal portion of disc weakly evenly convex in lateral view; U-shaped frontal impression deep in middle, shallow laterally. Temples strongly convex in dorsal view. Antennae (Fig. 145) 2.4 times longer than pronotum.

Pronotum (Fig. 147) with center strongly convex in frontal view; disc deeply depressed near middle of lateral edges, shallowly depressed along posterior margin and posterior portion of medial groove; the latter slightly arcuate in lateral view, deep, parallel-sided; hypomera ridged from anterior margin to laterobasal angle, disc without pit. Prosternal medial ridge entire. Scutellum with anterior margin subangulate in middle and posterior margin broadly arcuate toward right-angled apex.

Elytron gradually widened (Fig. 4); humeral callus low, moderately convex; disc with low swellings, shallowly depressed posteriorly along lateral edge, the latter finely carinate, indistinctly denticulate, slightly arcuate in dorsal view.

Abdomal sternites II and III with medial processes similar to that in Fig. 20, posterior portion of process of sternite III widened.

Male: Frontoclypeal area not modified. Protarsomeres 1 lacking tenent setae. Mesofemora (Fig. 152) shorter than metafemora (Fig. 153). Mesotibiae (Fig. 148) shorter than metatibiae (Fig. 149). Metatarsomeres 1 about as long as combined length of metatarsomeres 2-4. Peg-like setae arranged in two rows on mesotrochanters (Fig. 152), grouped in a field on mesotibiae and metatibiae, and absent from pro-trochanters, profemora, protibiae, mesofemora, metatrochanters and metafemora. Apex of abdominal tergite VIII as in Figs 150-151. Sternite VIII as in Fig. 146. Sternite IX lacking a subbasal protuberance. Aedeagus as in Figs 143-144.

Female: Unknown.

DISTRIBUTION AND NATURAL HISTORY: *Megarthus ogloblini* is known only from the type locality in Argentina (Loreto <27° 18' S; 55° 32' W>), which lies at an elevation of nearly 200 m, near the Rio Paraná. *Megarthus ogloblini* is the only Neotropical member of the genus collected below 1400 m. It is also the southernmost record of a species of Proteinini in the New World.

COMMENTS: *Megarthus ogloblini* differs from the other Neotropical *Megarthus*, except for *M. solitarius*, by the shape of the pronotum, which is shallowly emarginate laterobasally and has the lateral contours forming four denticles. It can be easily distinguished from *M. solitarius* by the sexual characters.

Megarthus solitarius Sharp, 1887

Figs 3, 154-170

Megarthus solitarius Sharp, 1887: 743.

TYPE MATERIAL: Holotype (♀, in BMNH): "*Megarthus solitarius*. Type D. S. Purula, Guatemala, Champion [Sharp's handwriting] / Purula, Vera Paz, Champion / B.C.A. Col. 1. 2. *Megarthus solitarius* Sharp".

ADDITIONAL MATERIAL: GUATEMALA, Bja Verapaz, 8km S Purulhá, 1650m 29.vi.1993 (Ashe & Brooks) #149, ex *Cecropia* treefall, 2 ♂♂ and 2 ♀♀ in MHNG and SEMC.

DESCRIPTION: Habitus as in Fig. 3. Combined length of pronotum and elytra = 1.3-1.5 mm; maximal pronotal width = 0.9-1.1 mm. Body dark brown with appendages slightly paler; antennomeres 10-11 paler than antennomeres 1-9. Dorsal pubescence fairly uniform, denser on pronotum than on elytra; frontal setae directed forward; elytral and pronotal setae slightly arcuate, recumbent; metasternal setae uniform, shorter than prosternal; pubescence on abdominal tergites parallel; that on sternites IV-VII uniform, except for a pair of subapical macrosetae on each sternite.

Frons, pronotum, elytra and anterior portion of prohypomera granulate; frontal granulation conspicuous, with granula about as high as their diameter, or higher; metasternum with granulofossulation becoming denser and finer posteriomedially.

Frons forming above clypeus a sharp ridge, the latter finely evenly carinate, evenly arcuate in dorsal view; mesal portion of disc weakly evenly convex in lateral view; U-shaped frontal impression deep in middle, shallow laterally. Temples strongly convex in dorsal view. Antennae (Fig. 165) 2.1-2.3 times longer than pronotum.

Pronotum (Fig. 169) with center moderately convex in frontal view; pronotal disc deeply depressed near middle of lateral edges, shallowly depressed along anterior margin, posterior margins and posterior portion of medial groove; the latter slightly arcuate in lateral view, deep, parallel-sided; hypomera ridged from anterior margin to laterobasal angle, disc without pit. Prosternal medial ridge absent. Scutellum with anterior margin subangulate in middle and posterior margin weakly arcuate toward right-angled apex.

Elytra gradually widened (Fig. 3); humeral callus low, moderately convex; disc with low swellings, moderately depressed posteriorly along lateral edge, the latter finely carinate, very finely denticulate, in dorsal view slightly arcuate.

Abdominal sternites II and III with medial processes as in Fig. 170, posterior portion of process of sternite III widened, or trifid.

Male: Frontoclypeal area not modified. Protarsomeres 1 lacking tenent setae. Mesofemora (Fig. 158) as long as metafemora. Mesotibiae (Fig. 159) shorter than metatibiae. Metatarsomeres 1 about as long as combined length of metatarsomeres 2-4. Peg-like setae arranged in a single row on mesotrochanters (Fig. 158), grouped in a field on mesotibiae, and absent from protrochanters, profemora, protibiae, mesofemora, metatrochanters, metafemora and metatibiae. Apex of abdominal tergite VIII as in Figs 156, 157. Sternite VIII as in Figs 160-161. Sternite IX lacking subbasal protuberance. Aedeagus as in Figs 154, 155.

Female: Abdominal tergite VIII (Figs 166-167) with a medioapical projection. Sternite VIII as in Fig. 168. Genital segments as in Figs 162-164; gonocoxal plate bearing a mediodorsal ridge.

DISTRIBUTION AND NATURAL HISTORY: *Megarthus solitarius* is apparently endemic to Guatemala (Dept de Baja Verapaz), where it was collected in *Cecropia treefall* at an elevation of 1650 m.

COMMENTS: *Megarthus solitarius* and *M. zunilensis* are apparently the only Neotropical *Megarthus* with the abdominal tergite VIII forming a medioapical projection in the female. These two species differ, however, in most of the other sexual characters. See discussion under *M. ogloblini*.

***Megarthus zunilensis* Sharp, 1887**

Figs 6, 171-187

Megarthus zunilensis Sharp, 1887: 743.

TYPE MATERIAL: Lectotype (♂, in BMNH): "*Megarthus zunilensis*. Type D. S., Cerro Zunil. Guatem., Champion [Sharp's handwriting] | Cerro Zunil, Guatemala, Champion | B.C.A. Col. 1. 2. *Megarthus zunilensis* Sharp". - Paralectotypes (2 ♀♀ in BMNH): same data as lectotype, but "Sp. figured"; same data as lectotype, but "Cerro Zunil, 4-5000 ft., Champion", **by present designation.**

ADDITIONAL MATERIAL: COSTA RICA, Puntarenas, Monteverde Biol. Res., ca. 1500m, 23-24.v.1979 (Campbell) 1 ♂ in CNCI. – GUATEMALA, Quetzaltenango, 14.2km SW Zunil, 1340m, 20.vi.1993 (Génier) ex human faeces trap, 1 ♀ in SEMC. – Sacatepequez, 4.5km SW san Miguel, Duenas, 1760m, 12.vi.1991 (Anderson) #91-61, ex mesic hardwood litter, 1 ♂ in SEMC. – Zacapa, 3.5km SE La Union, 1500m, 4.vi.1991 (Anderson) #91-50, ex cloud forest litter, 1 ♀ in SEMC; same data, but 23-25.vi.1993 (Brooks & Ashe) #103, ex flight intercept trap, 1 ♀ in MHNG. – HONDURAS, Santa Barbara, Mt. Santa Barbara, 11.5km S & 5.6km W Peña Blanca <14°57'N; 88°05'W> 1800m, 20.vi.1994 (Brooks & Ashe) #163, ex decaying slash, 2 ♂ ♂ and 2 ♀ ♀ in MHNG and SEMC; same data, but #164, ex treefall litter, 1 ♂ and 2 ♀ ♀ in SEMC. – NICARAGUA, El Cerro Cimborazo <13°02'N; 85°56'W> 1400m, 20.xi.1971 (Stockwell) 1 ♂ in FMNH.

DESCRIPTION: Habitus as in Fig. 6. Combined length of pronotum and elytra = 1.4-1.5 mm; maximal pronotal width = 1.0-1.1 mm. Body dark brown with appendages slightly paler; antennomeres 10-11 paler than antennomeres 1-9. Dorsal pubescence denser on head and pronotum than on elytral disc, becoming denser along medial groove of pronotum and on anterior portion of elytral disc; frontal setae directed forward; elytral and pronotal setae slightly arcuate, recumbent; metasternal pubescence becoming denser anteriorly, longer than that of prosternum; pubescence on abdominal tergites parallel, uniform; that on sternites IV-VII uniform. Frons, pronotum, lateral portion of elytral disc and anterior portion of prohypomera granulate; frontal granulation conspicuous, with granula about as high as their diameter, or higher; metasternum coarsely granulofossulate.

Frons forming above clypeus a sharp ridge, the latter finely evenly carinate, weakly arcuate in middle and laterally oblique in dorsal view; mesal portion of disc strongly evenly convex in lateral view; U-shaped frontal impression shallow. Temples strongly convex in dorsal view. Antennae (Fig. 182) 2.1-2.3 times longer than pronotum.

Pronotum (Fig. 186) with center strongly convex in frontal view; disc deeply depressed near middle of lateral edges, shallowly depressed along anterior margin, posterior margin and posterior portion of medial groove; the latter slightly arcuate in lateral view, deep, parallel-sided; hypomera ridged from anterior margin to laterobasal angle, disc without pit. Prosternal medial ridge absent. Scutellum with anterior margin rounded and posterior margin slightly arcuate toward acutely angular apex.

Elytra gradually widened (Fig. 6); humeral callus low, moderately convex; disc with low swellings, moderately depressed posteriorly along lateral edge; the latter finely carinate, indistinctly denticulate, slightly arcuate in dorsal view.

Abdominal sternites II and III with medial processes as in Fig. 184, posterior portion of process of sternite III straight.

Male: Frontoclypeal area not modified. Protarsomere 1 lacking tenent setae. Mesofemora (Fig. 175) as long as metafemora. Mesotibiae (Fig. 174) shorter than metatibiae (Fig. 173). Metatarsomeres 1 about as long as combined length of metatarsomeres 2-4. Peg-like setae arranged in a single row on mesotrochanters (Fig. 175), grouped in a field on mesotibiae and metatibiae, and absent from protrochanters, profemora, protibiae, mesofemora, metatrochanters and metafemora. Apex of abdominal tergite VIII as in Figs 176, 178. Sternite VIII as in Fig. 177. Sternite IX lacking subbasal protuberance. Aedeagus as in Figs 171-172.

Female: Abdominal tergite VIII (Figs 185, 187) bearing medioapical projection. Sternite VIII as in Fig. 183. Genital segments as in Figs 179-181; gonocoxal plate lacking a mediiodorsal ridge.

DISTRIBUTION AND NATURAL HISTORY: The species is known from Costa Rica, Guatemala, Honduras and Nicaragua. It was collected by sifting leaf litter or using flight intercept and faeces traps in mesic hardwood forests and cloud forests at elevations ranging between 1300 and 3100m. It is the most widespread *Megarathrus* treated in this study.

COMMENTS: Among Neotropical *Megarathrus*, *M. zunilensis* is particularly notable by the gonocoxal plate lacking a mediodorsal ridge in females, in combination with the frontal setae directed forward and the eleventh antennomere ovoid. The latter two characters are shared only with *M. flavosignatus*, of which only the male is known and which has a differently shaped aedeagus. See comments under *M. flavosignatus*.

DISCUSSION

SYSTEMATICS: The *Megarathrus* fauna of the Americas south of the Rio Grande is rather homogeneous. Except for the Mexican *M. altivagans*, all the species typically share the presence of a long prohypomeral ridge extended posteriorly to the laterobasal angle, the frontal pubescence directed forward, the terminal antennomere piriform, and the lack of adventral adhesive setae on the first male protarsomere, forming the *M. inaequalis*-supergroup. Amazingly this combination of characters is found elsewhere only in the *M. auricola*-group, which contains all the New Guinean *Megarathrus*, suggesting a close historical connection between these two faunas (Cuccodoro, 1998).

Megarathrus altivagans has the frontal setae directed backward, lacks a prohypomeral ridge, and bears adventral adhesive setae on the first male protarsomere. This combination of characters is typical of the *M. depressus*-supergroup, which contains most of the Nearctic, Palaearctic and Afrotropical species of the genus.

NATURAL HISTORY: The Neotropical *Megarathrus* appear to be confined to mountainous forested areas, with a marked preference for elevations ranging from 1500 to 2100 m a. s. l. Of the species treated here, nine have been collected within this altitudinal range, while only three were found between 1200-1500 m, and three between 2100-4000 m. They have been found on and in fungi, in carrion, leaf litter and other decaying plant debris, by sifting or by using flight interception, human faeces and squid carrion traps. All the specimens examined possess fully developed wings, and many of them have been collected in flight.

DIVERSITY AND DISTRIBUTIONAL PATTERN: Of the eleven *Megarathrus* species treated in this study, eight are from the mountains of Central America; the others are from Mexico (*M. altivagans*), northern Argentina (*M. ogloblini*) and Peru (*M. machu*). These species, however, represent only a poor fraction of the real diversity of the genus in the Neotropics. In fact, some 90% of the specimens I had on loan for the present study belong to undescribed species. In this material (mainly from CNCI, FMNH & SEMK) I recognised additional eleven species from Mexico, eleven species from Costa Rica, Guatemala, Honduras, Nicaragua and Panama, and fifteen species from Bolivia, southern Brazil, Columbia, Equator, Peru and Venezuela. These species all seem to be confined to a particular mountain, or at most a mountain range. As far as can be seen at the moment, there is no shared *Megarathrus* species between Mexico and North America, and the faunas of Mexico, of Central America and of South

America seem also entirely distinct. Moreover, the two latter areas of endemism appear inhabited almost exclusively by species of the *M. inaequalis* super-group. With a total of at least forty-eight species, it appears that the diversity of *Megarthus* in the Neotropics exceeds by three times that of the Nearctic realm (twelve species; Cuccodoro & Löbl, 1996) and is even greater than that of Subsaharan Africa (forty-two species; Cuccodoro & Löbl, 1995; Cuccodoro, 1999). Nevertheless, it remains relatively low compared to that of North India and Nepal (at least sixty-four species), where the genus is additionally phylogenetically much more diverse (Cuccodoro, 2003).

ACKNOWLEDGEMENTS

The following colleagues have generously lent specimens examined in the present study: the late J. S. Ashe, SEMK, N. Diaz and L. Fernandez, MLPA, M. K. Thayer and A. F. Newton Jr., FMNH, and A. Smetana, CNCI. I also thank F. Marteau, MHNG, for scanning the line drawings and numbering the figures.



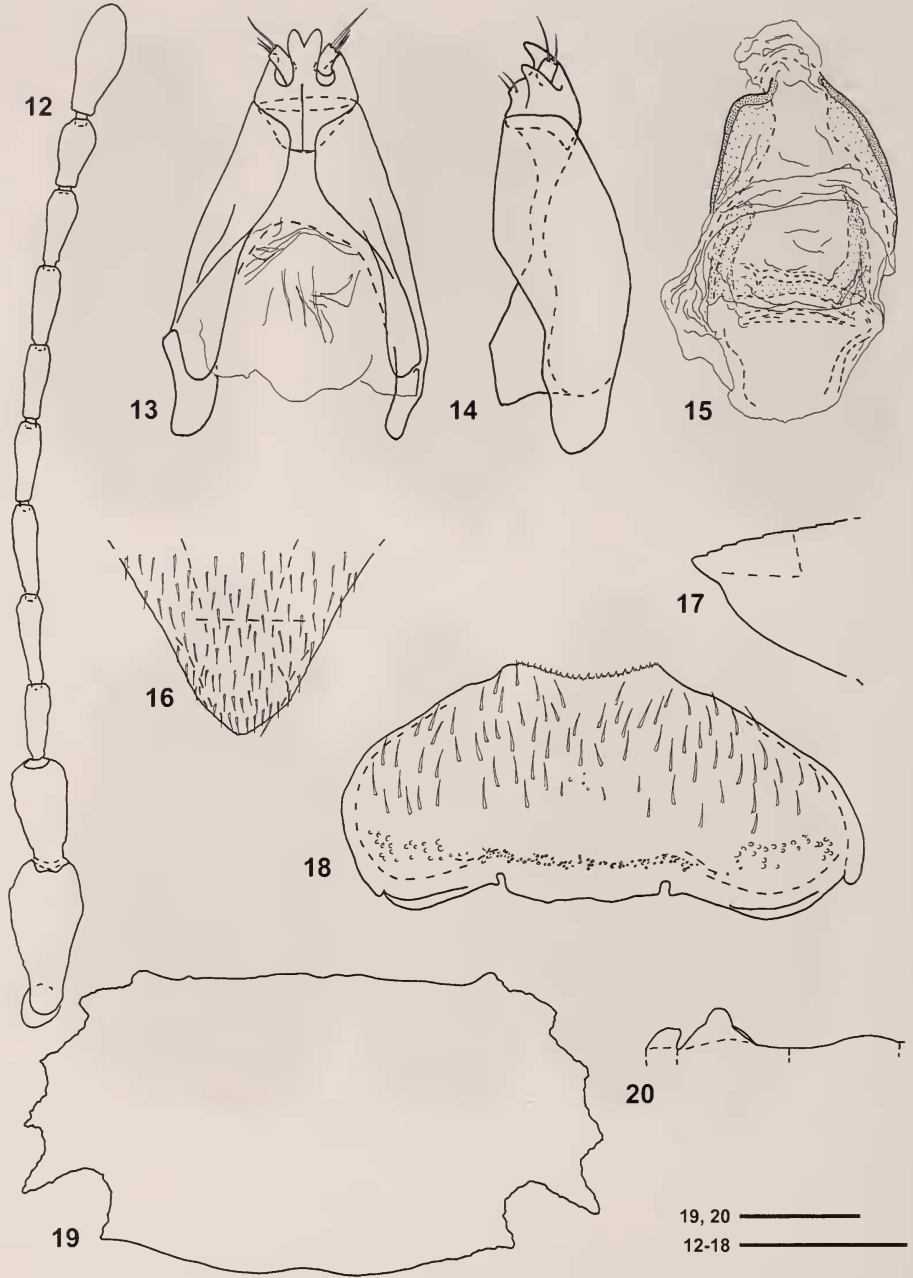
FIGS 1-6

Megarthus, habitus. (1) *M. altivagans* Bernhauer, female, genital segments dissected. (2) *M. mammiger* Bierig, male, genital segments dissected. (3) *M. solitarius* Sharp, male. (4) *M. ogloblini* Bruch, male, holotype. (5) *M. flavosignatus* Bierig, male, genital segments dissected. (6) *M. zunilensis* Sharp, female. Scale bars = 1 mm.



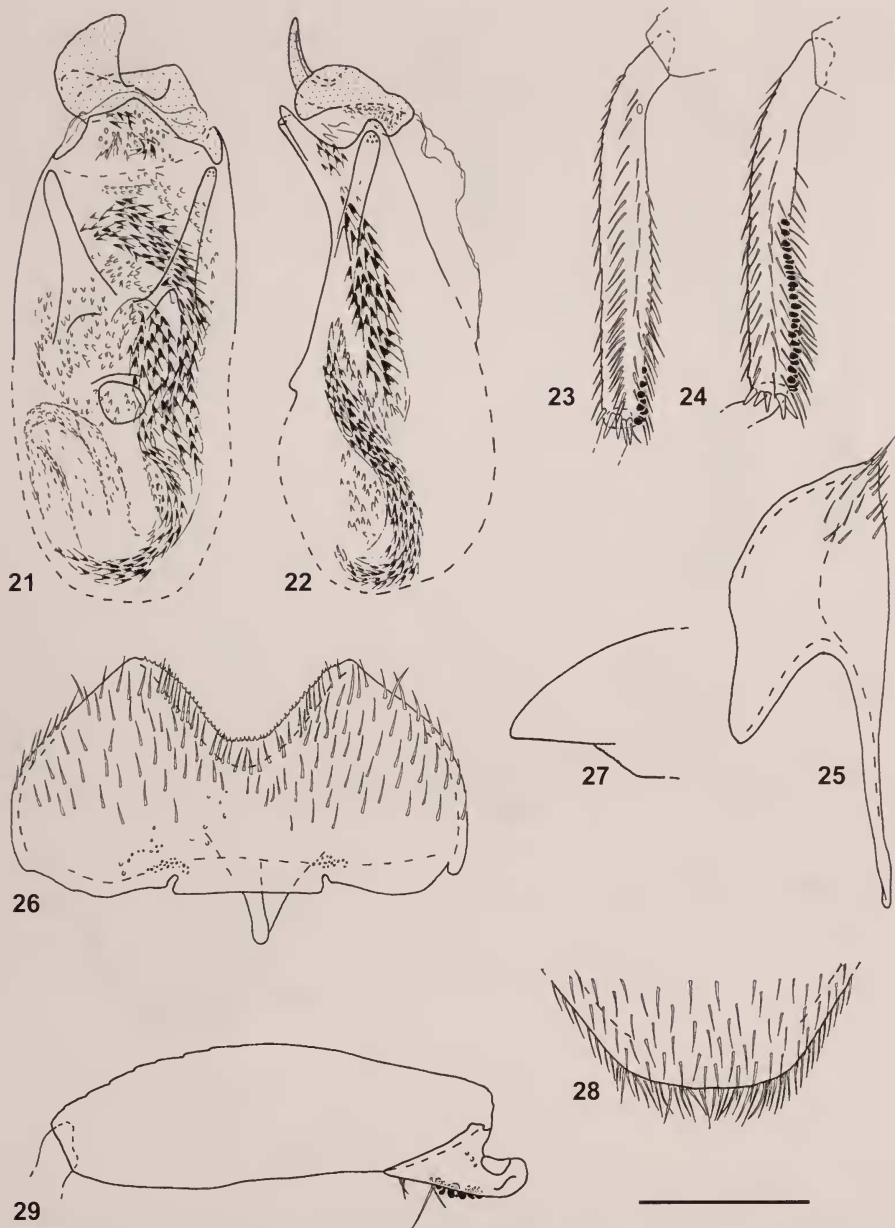
FIGS 7-11

Megarthus, habitus. (7) *M. bierigi* sp. n., female, genital segments dissected. (8) *M. inaequalis* Bierig, female. (9) *M. mastiger* Bierig, female, genital segments dissected. (10) *M. adelphus* Bierig, female, genital segments dissected. (11) *M. machu* sp. n., male, holotype, genital segments dissected. Scale bars = 1 mm.



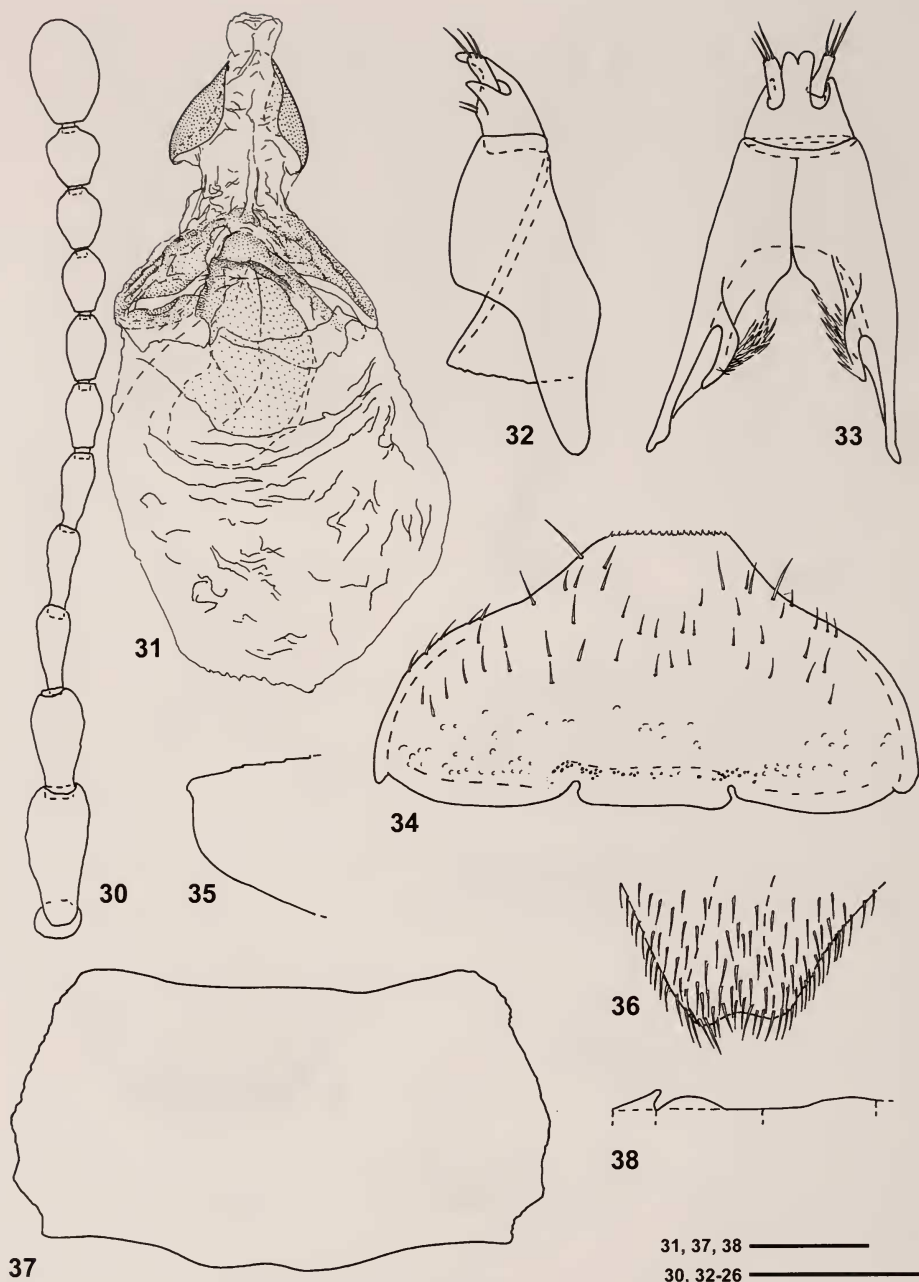
FIGS 12-20

Megarthrus adelphus Bierig; antenna (12); female, genital segments, sternites in dorsal (13) and lateral (14) views, and tergites in ventral view (15); female, apex of abdominal tergite VIII in dorsal (16) and lateral (17) views; female, abdominal sternite VIII in ventral view (18); pronotum (19); medial area of abdominal sternites II-IV (left to right, upside down) in lateral view (20). Scale bars = 0.2 mm.



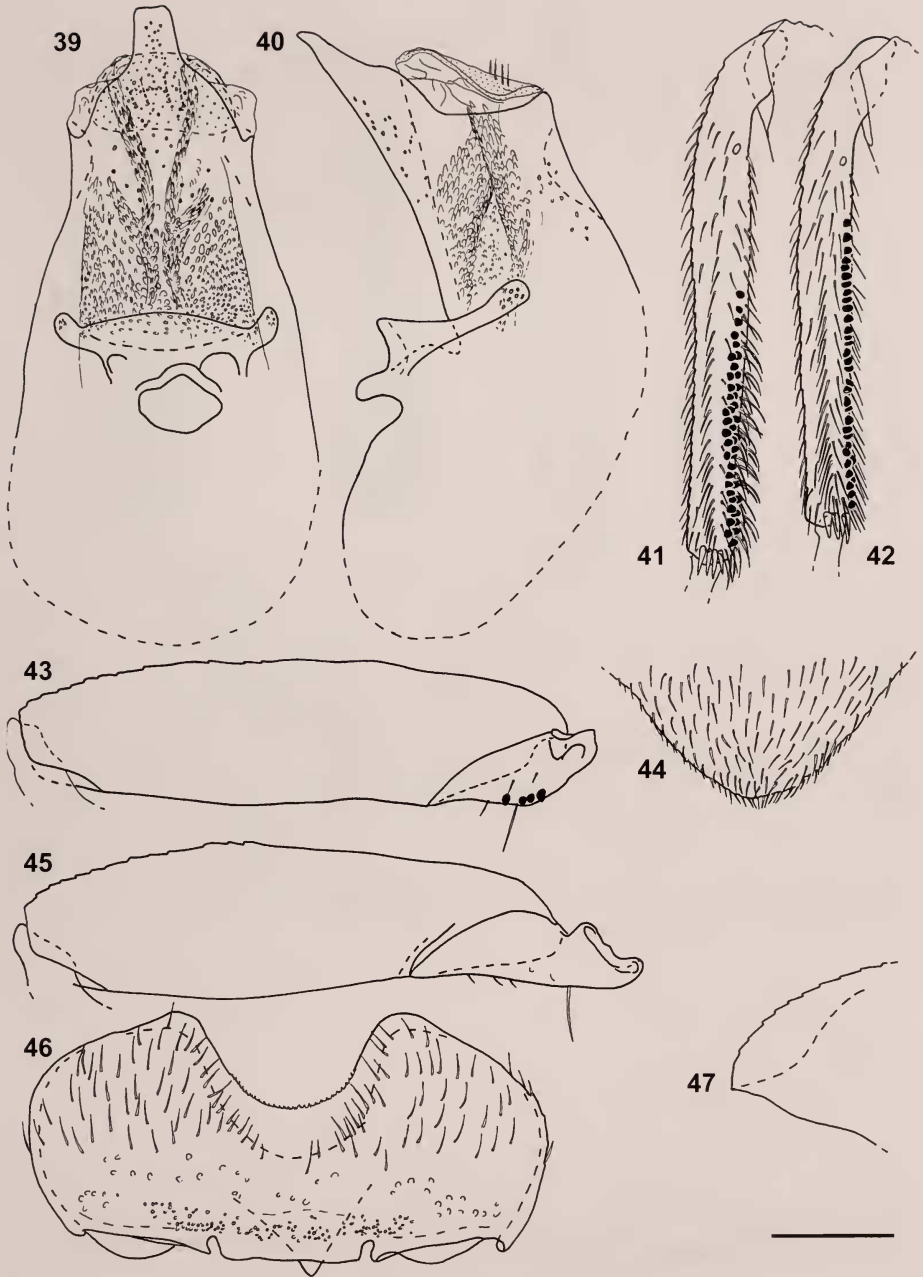
FIGS 21-29

Megarthus altivagans Bernhauer, male; aedeagus in ventral (21) and lateral (22) views; metatibia (23); mesotibia (24); abdominal hemitergite 9 (25); abdominal sternite VIII in ventral view (26); apex of abdominal tergite VIII in lateral (27) and dorsal (28) views; mesotrochanter and mesofemur (29). Scale bar = 0.2 mm.



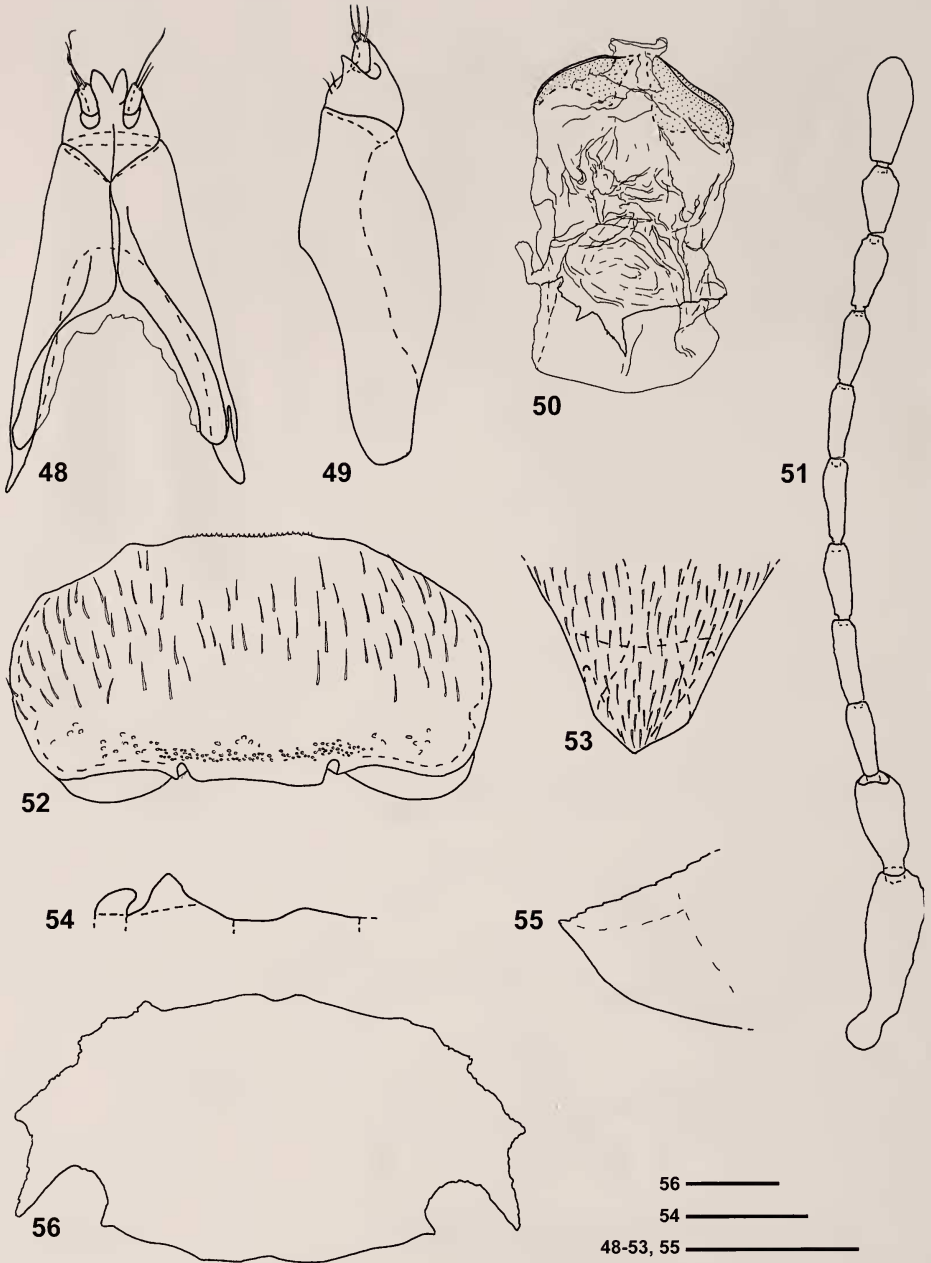
FIGS 30-38

Megarthus altivagans Bernhauer; antenna (30); female, genital segments, tergites in ventral view (31), and sternites in lateral (32) and dorsal (33) views; female, abdominal sternite VIII in ventral view (34); female, apex of abdominal tergite VIII in lateral (35) and dorsal (36) views; pronotum (37); medial area of abdominal sternites II-IV (left to right, upside down) in lateral view (38). Scale bars = 0.2 mm.



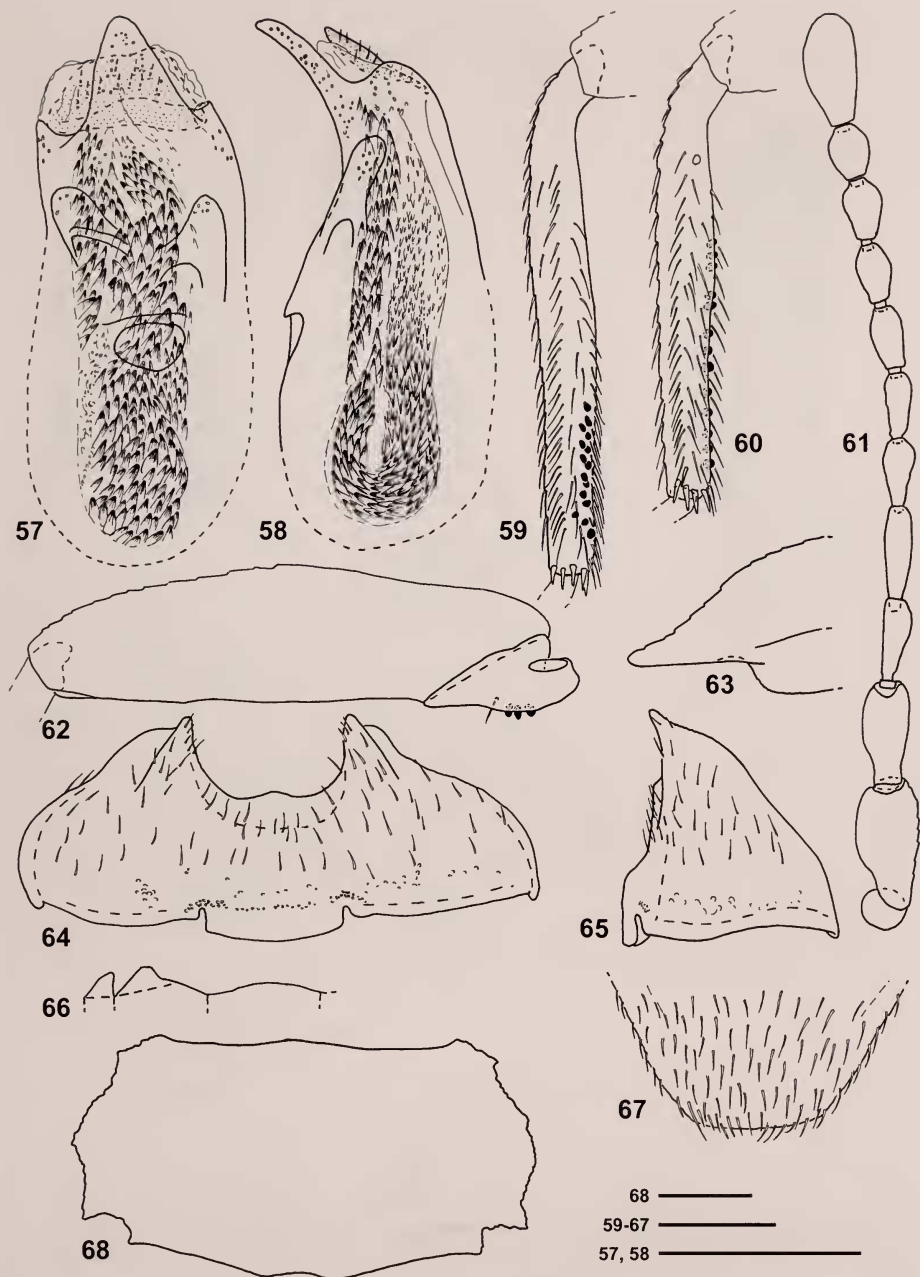
FIGS 39-47

Megarthus bierigi sp. n., male; aedeagus in ventral (39) and lateral (40) views; metatibia (41); mesotibia (42); mesotrochanter and mesofemur (43); apex of abdominal tergite VIII in dorsal (44) and lateral (47) views; metatrochanter and metafemur (45); abdominal sternite VIII in ventral view (46). Scale bar = 0.2 mm.



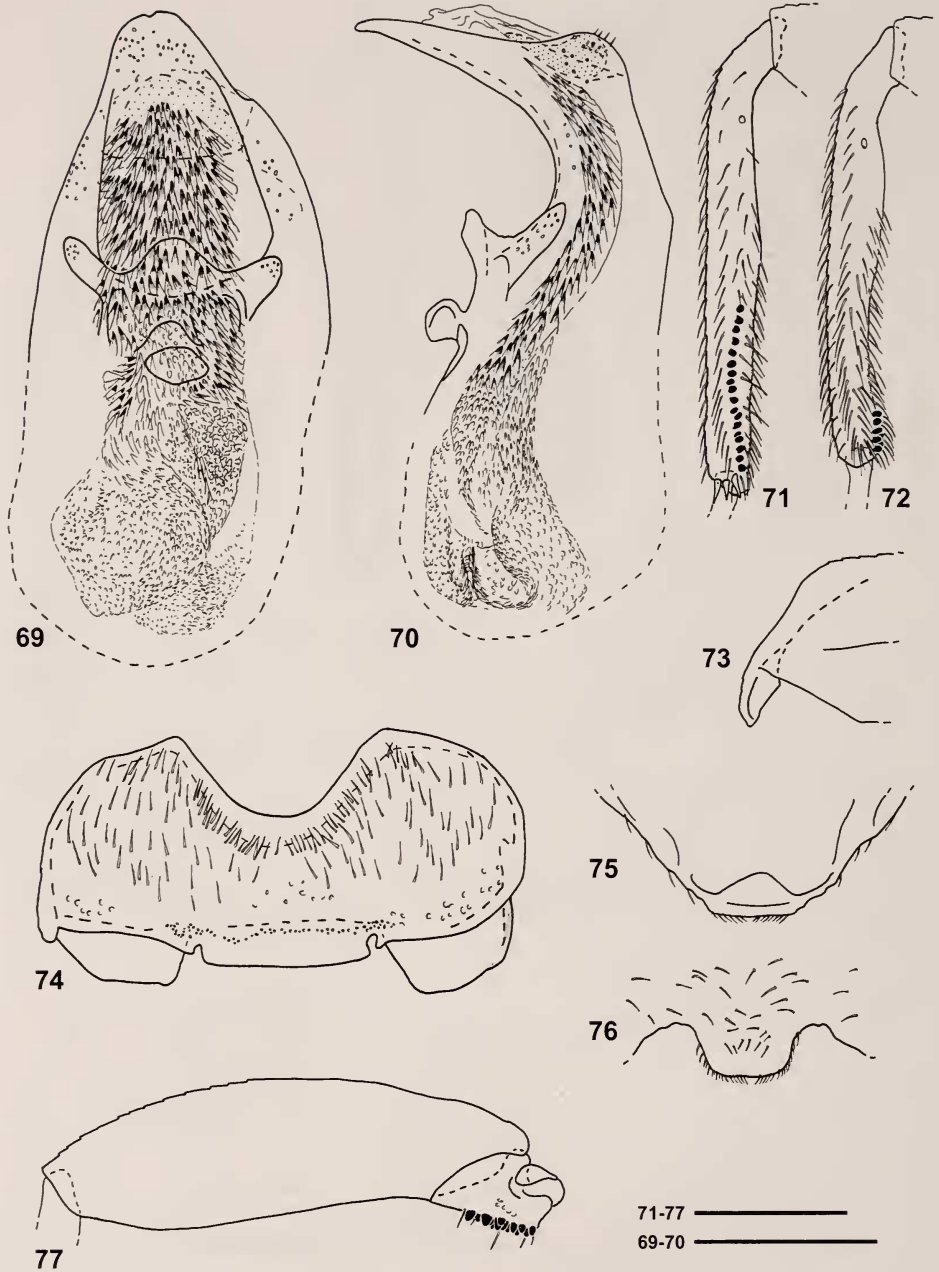
FIGS 48-56

Megarthrus bierigi sp. n.; female, genital segments, sternites in dorsal (48) and lateral (49) views, and tergites in ventral view (50); antenna (51); female, abdominal sternite VIII in ventral view (52); female, apex of abdominal tergite VIII in dorsal (53) and lateral (55) views; medial area of abdominal sternites II-IV (left to right, upside down) in lateral view (54); pronotum (56). Scale bars = 0.2 mm.



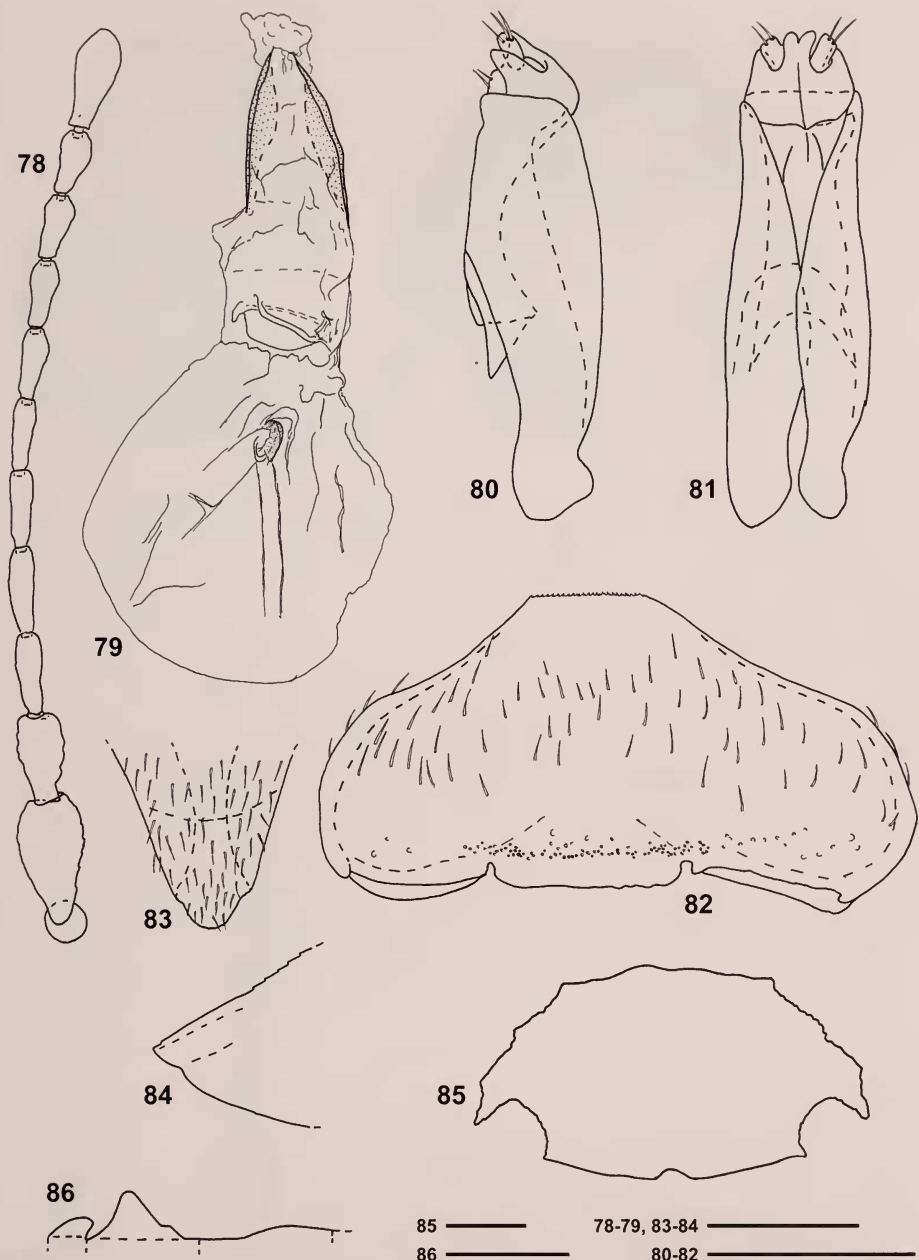
FIGS 57-68

Megarthus flavosignatus Bierig, male; aedeagus in ventral (57) and lateral (58) views; metatibia (59); mesotibia (60); antenna (61); mesotrochanter and mesofemur (62); apex of abdominal tergite VIII in lateral (63) and dorsal (67) views; abdominal sternite VIII in ventral (64) and lateral (65) views; medial area of abdominal sternites II-IV (left to right, upside down) in lateral view (66); pronotum (68). Scale bars = 0.2 mm.



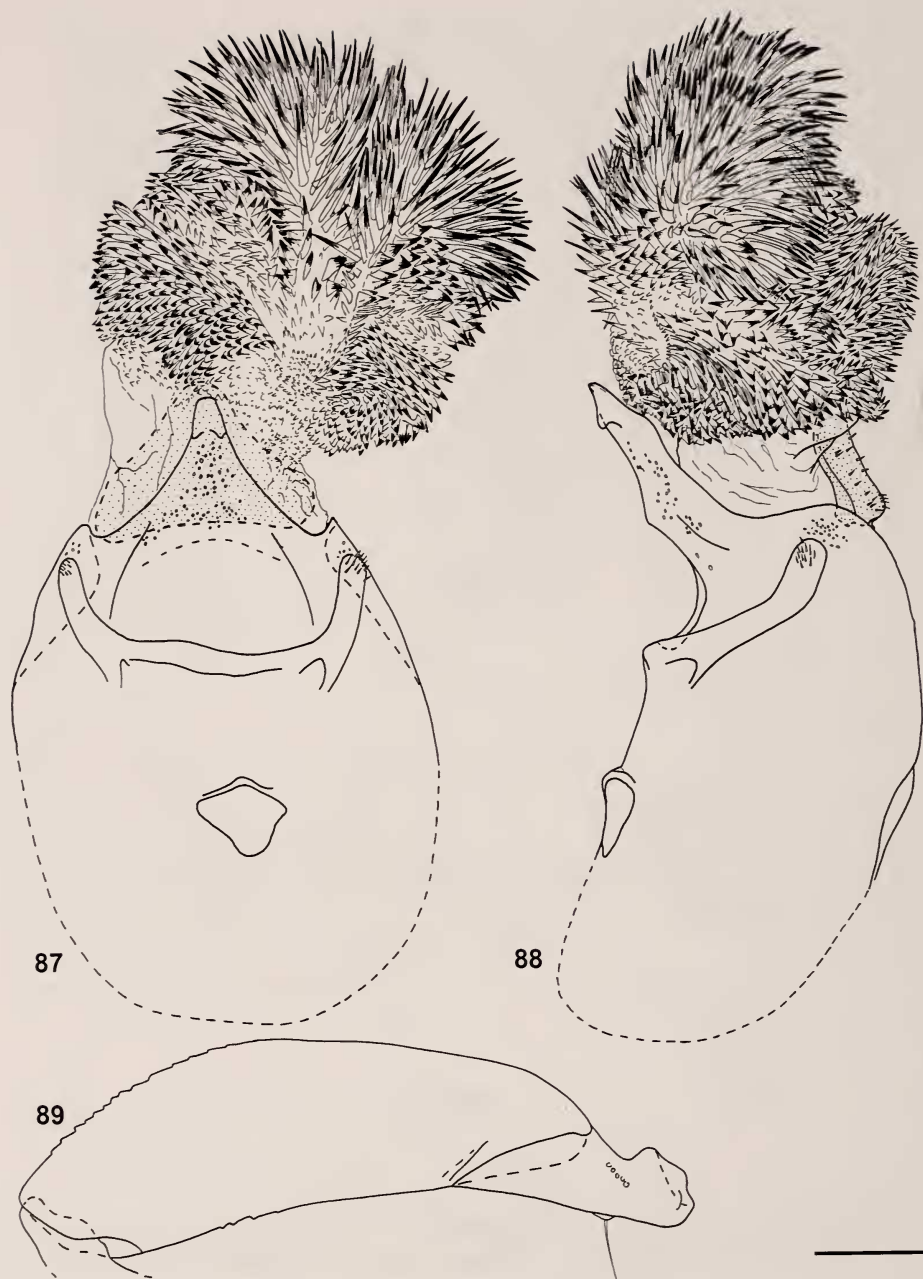
FIGS 69-77

Megarthrus inaequalis Bierig, male; aedeagus in ventral (69) and lateral (70) views; metatibia (71); mesotibia (72); apex of abdominal tergite VIII in lateral (73), ventral (75) and posterior (76) views; abdominal sternite VIII in ventral view (74); mesotrochanter and mesofemur (77). Scale bars = 0.2 mm.



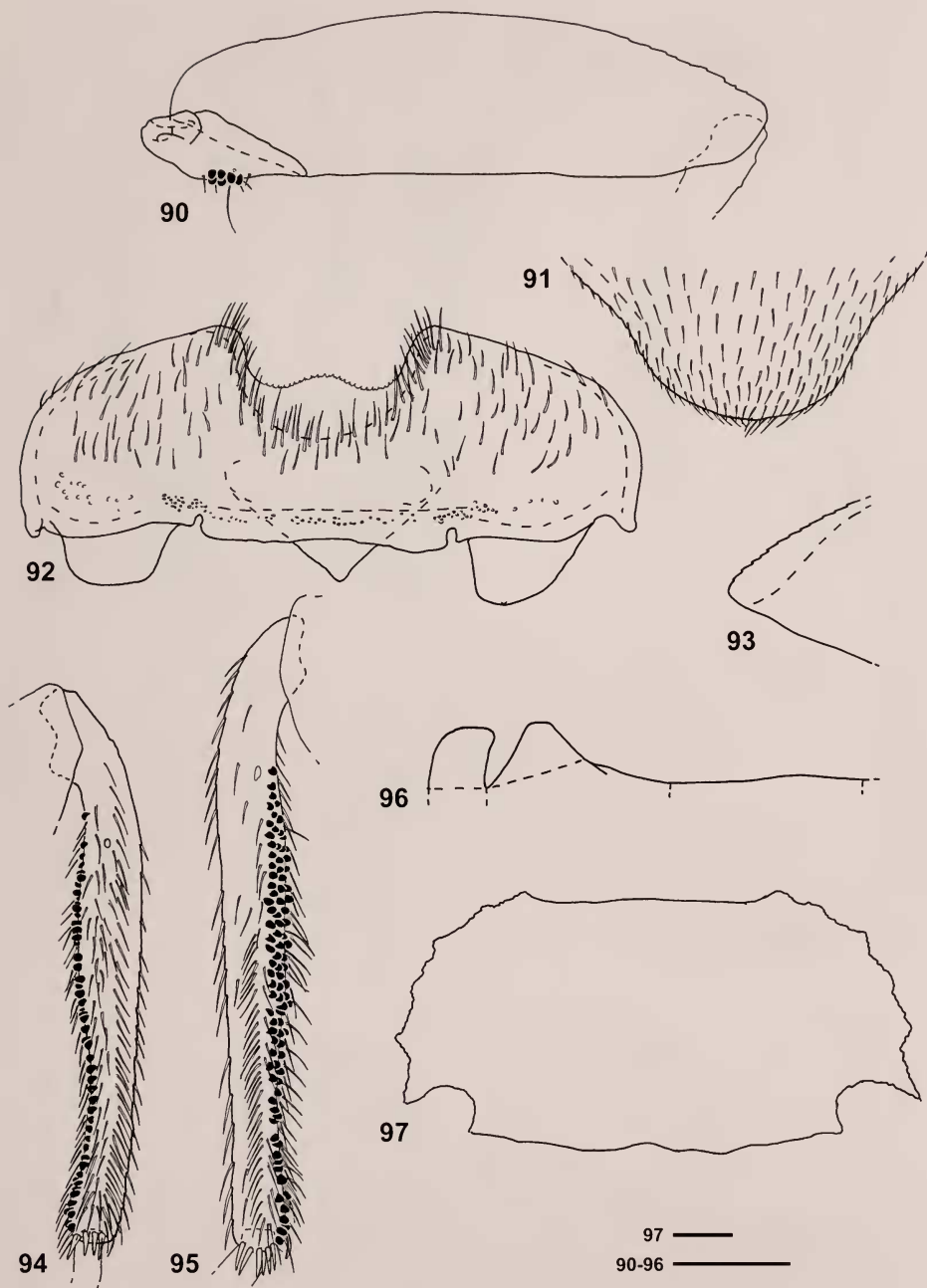
FIGS 78-86

Megarthus inaequalis Bierig; antenna (78); female, genital segments, tergites in ventral view (79), and sternites in lateral (80) and dorsal (81) views; female, abdominal sternite VIII in ventral view (82); female, apex of abdominal tergite VIII in dorsal (83) and lateral (84) views; pronotum (85); medial area of abdominal sternites II-IV (left to right, upside down) in lateral view (86). Scale bars = 0.2 mm.



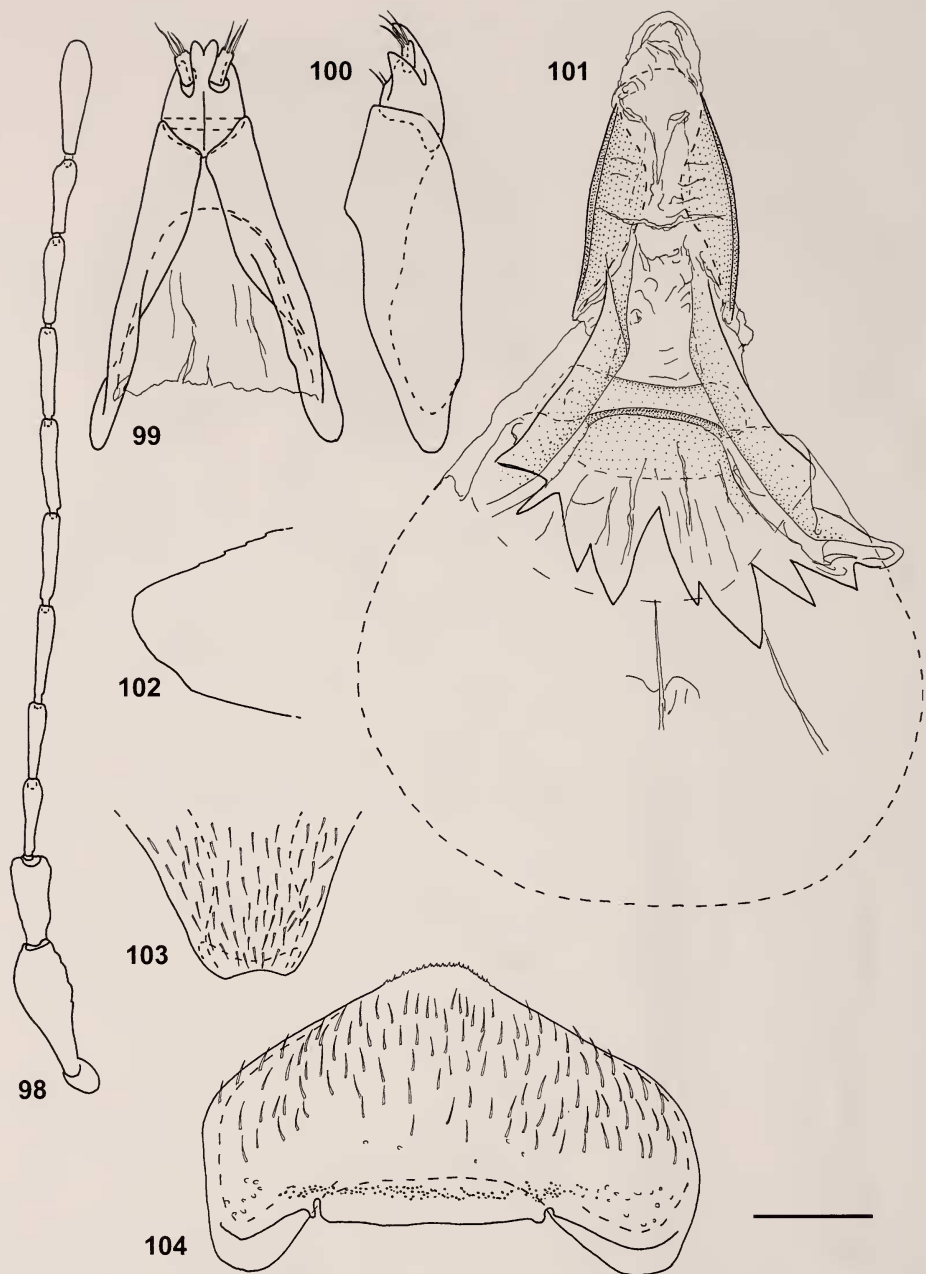
FIGS 87-89

Megarthus machu sp. n., male; aedeagus (internal sac extruded) in ventral (87) and lateral (88) views; metatrochanter and metafemur (89). Scale bar = 0.2 mm.



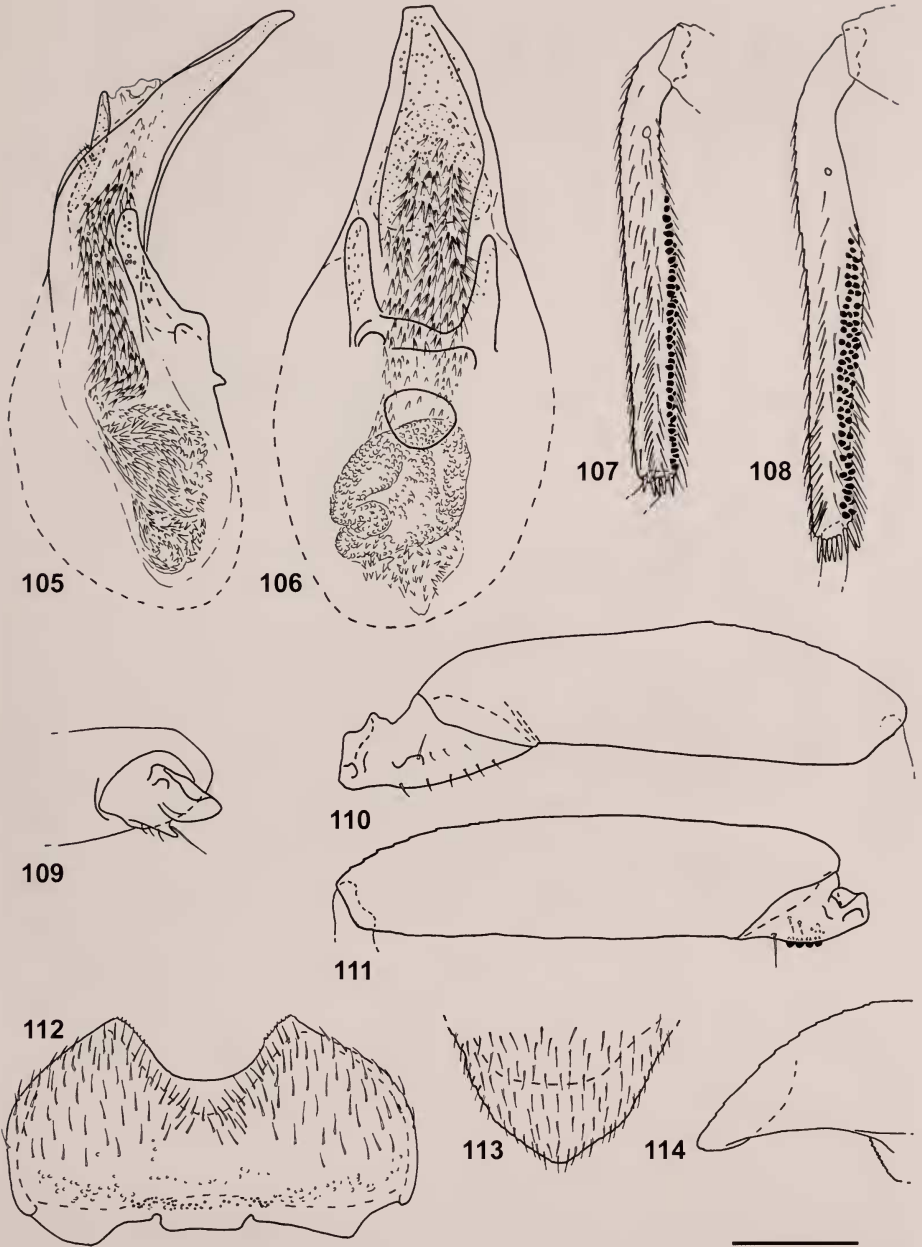
FIGS 90-97

Megarthus machu sp. n.; male, mesotrochanter and mesofemur (88); male, apex of abdominal tergite VIII in dorsal (91) and lateral (93) views; male, abdominal sternite VIII in ventral view (92); male, mesotibia (94); male, metatibia (95); pronotum (97). Scale bars = 0.2 mm.



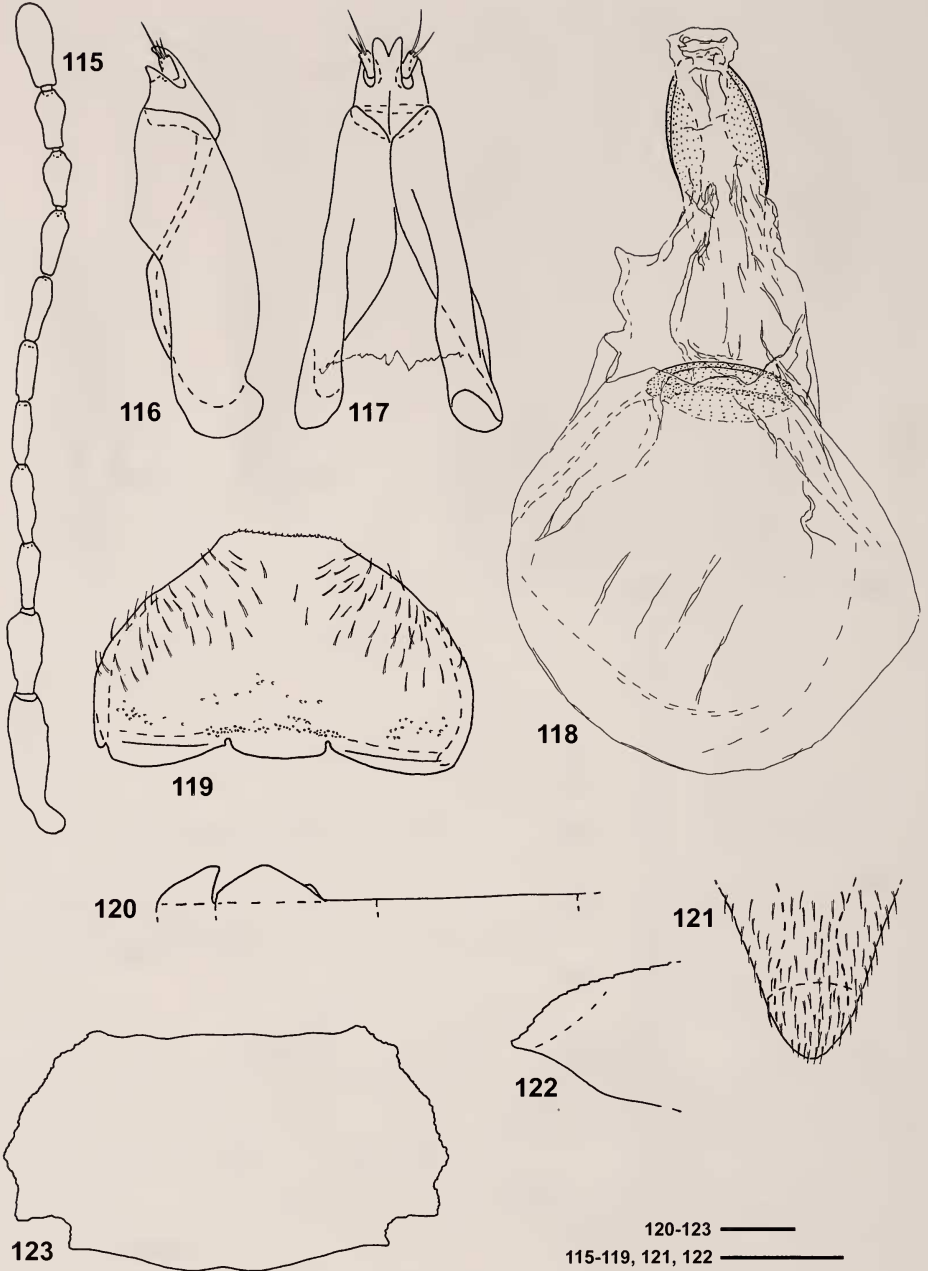
FIGS 98-104

Megarthrus machu sp. n.; antenna (98); female, genital segments, sternites in dorsal (139) and lateral (100) views, and tergites in ventral view (101); female, apex of abdominal tergite VIII in lateral (102) and dorsal (103) views; female, abdominal sternite VIII in ventral view (104). Scale bar = 0.2 mm.



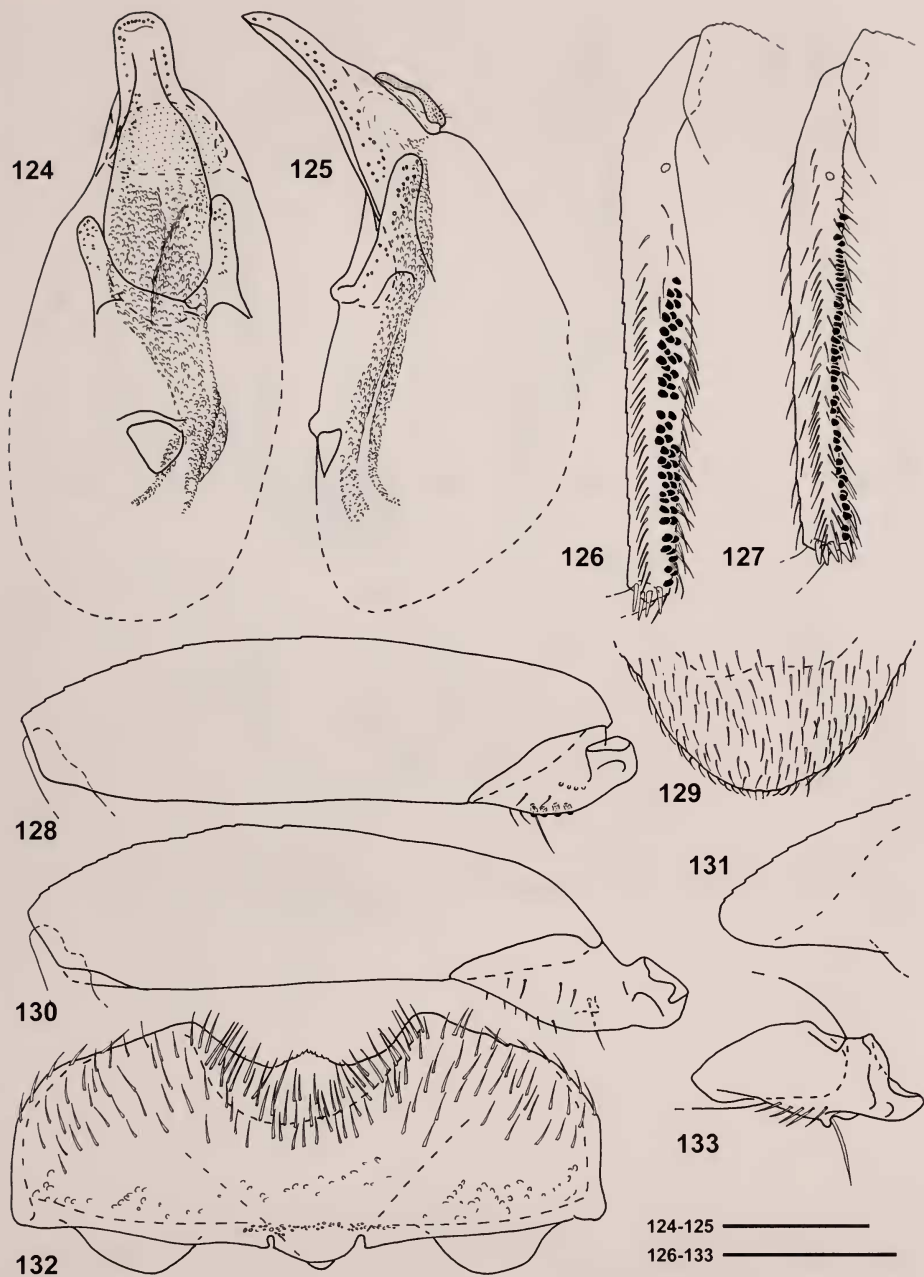
FIGS 105-114

Megarthus mammiger Bierig, male; aedeagus in lateral (105) and ventral (106) views; meso-tibia (107); metatibia (108); metatrochanter in mesal view (109); metatrochanter and metafemur (110); mesotrochanter and mesofemur (111); abdominal sternite VIII in ventral view (112); apex of abdominal tergite VIII in dorsal (113) and lateral (114) views. Scale bar = 0.2 mm.



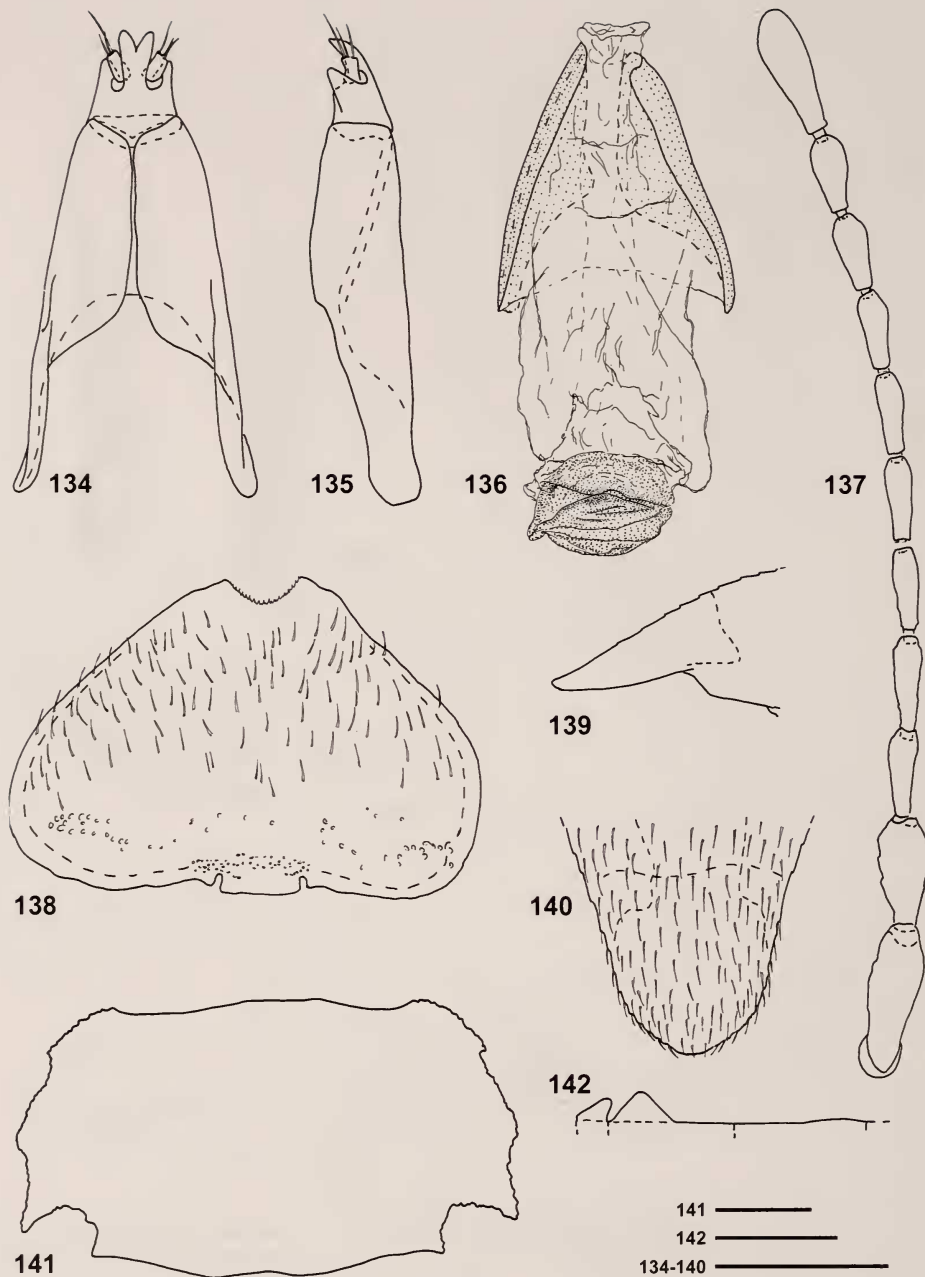
FIGS 115-123

Megarthus mammiger Bierig; antenna (115); female, genital segments, sternites in lateral (116) and dorsal (117) views, and tergites in ventral view (118); female, abdominal sternite VIII in ventral view (119); medial area of abdominal sternites II-IV (left to right, upside down) in lateral view (120); female, apex of abdominal tergite VIII in dorsal (121) and lateral (122) views; pronotum (123). Scale bars = 0.2 mm.



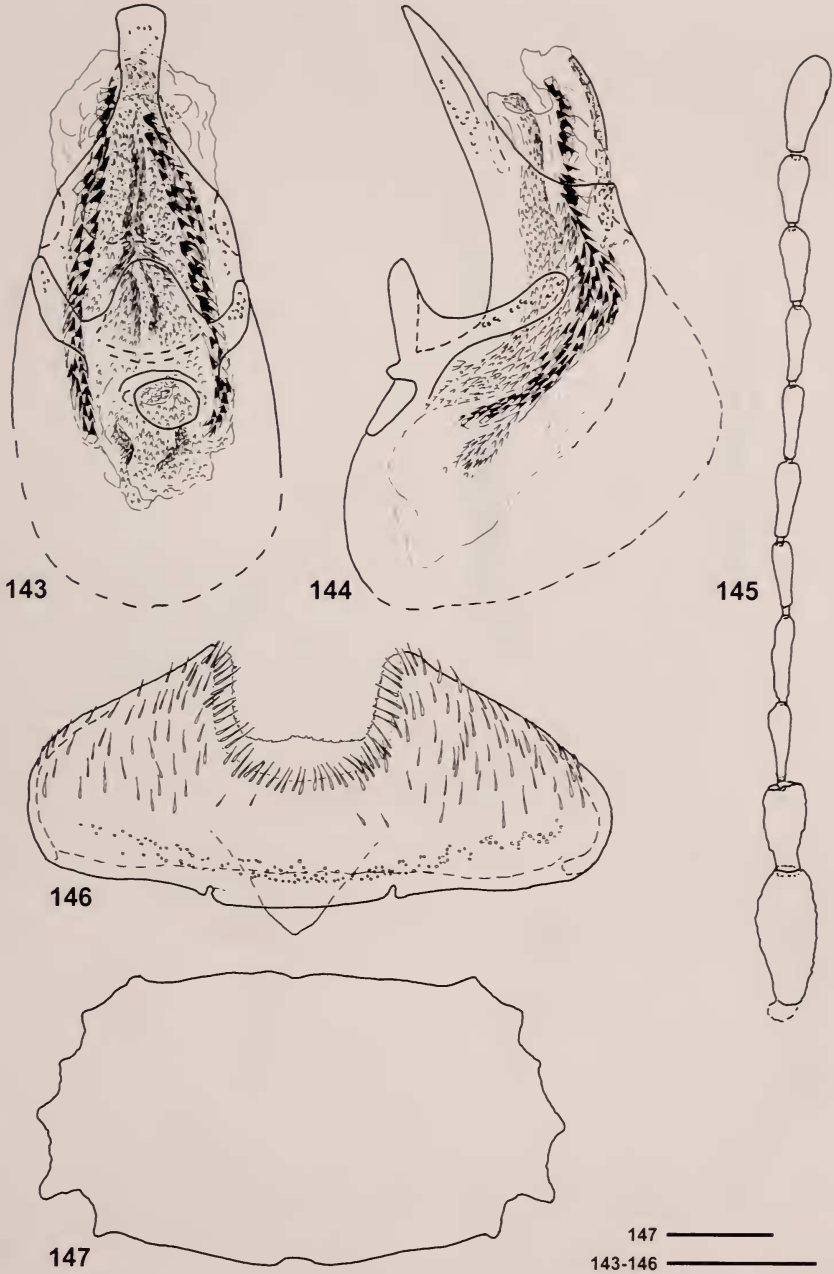
FIGS 124-133

Megarthus mastiger Bierig, male; aedeagus in ventral (124) and lateral (125) views; metatibia (126); mesotibia (127); mesotrochanter and mesofemur (128); apex of abdominal tergite VIII in dorsal (129) and lateral (131) views; metatrochanter and metafemur (130); abdominal sternite VIII in ventral view (132); metatrochanter in mesal view (133). Scale bars = 0.2 mm.



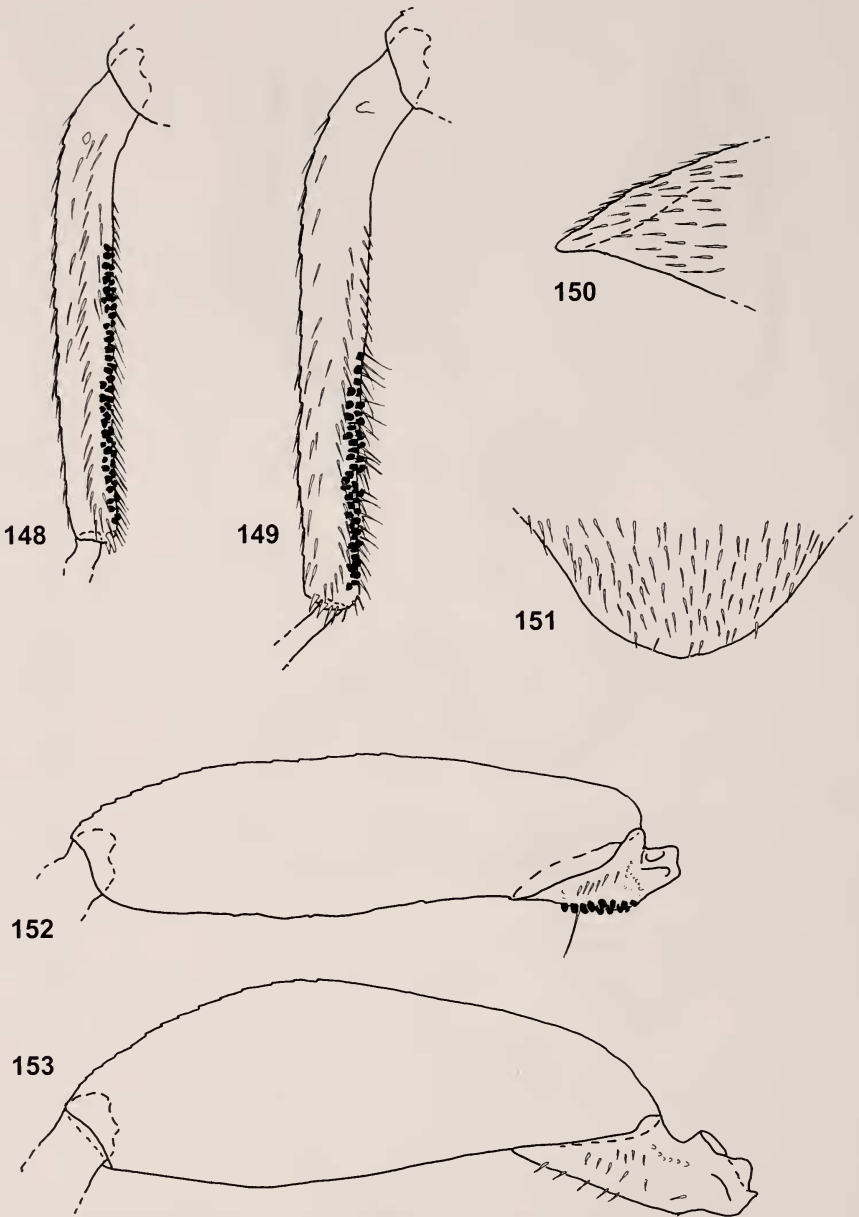
FIGS 134-142

Megarthrus mastiger Bierig; female, genital segments, sternites in dorsal (134) and lateral (135) views, and tergites in ventral view (136); antenna (137); female, abdominal sternite 8 in ventral view (138); female, apex of abdominal tergite 8 in lateral (139) and dorsal (140) views; pronotum (141); medial area of abdominal sternites II-IV (left to right, upside down) in lateral view (142). Scale bars = 0.2 mm.



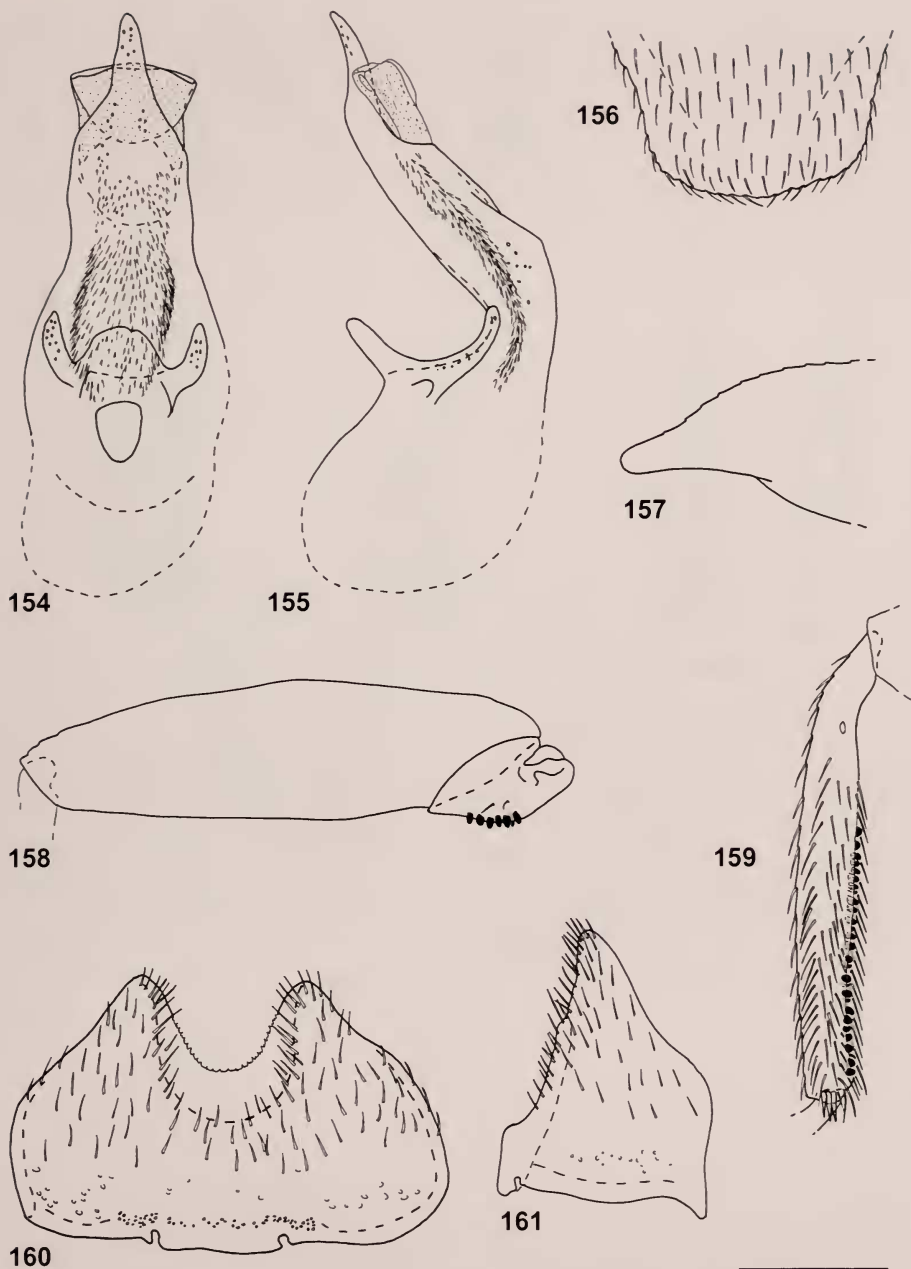
FIGS 143-147

Megarthus ogloblini Bruch, male; aedeagus in ventral (143) and lateral (144) views; antenna (145); abdominal sternite VIII in ventral view (146); pronotum (147). Scale bars = 0.2 mm.



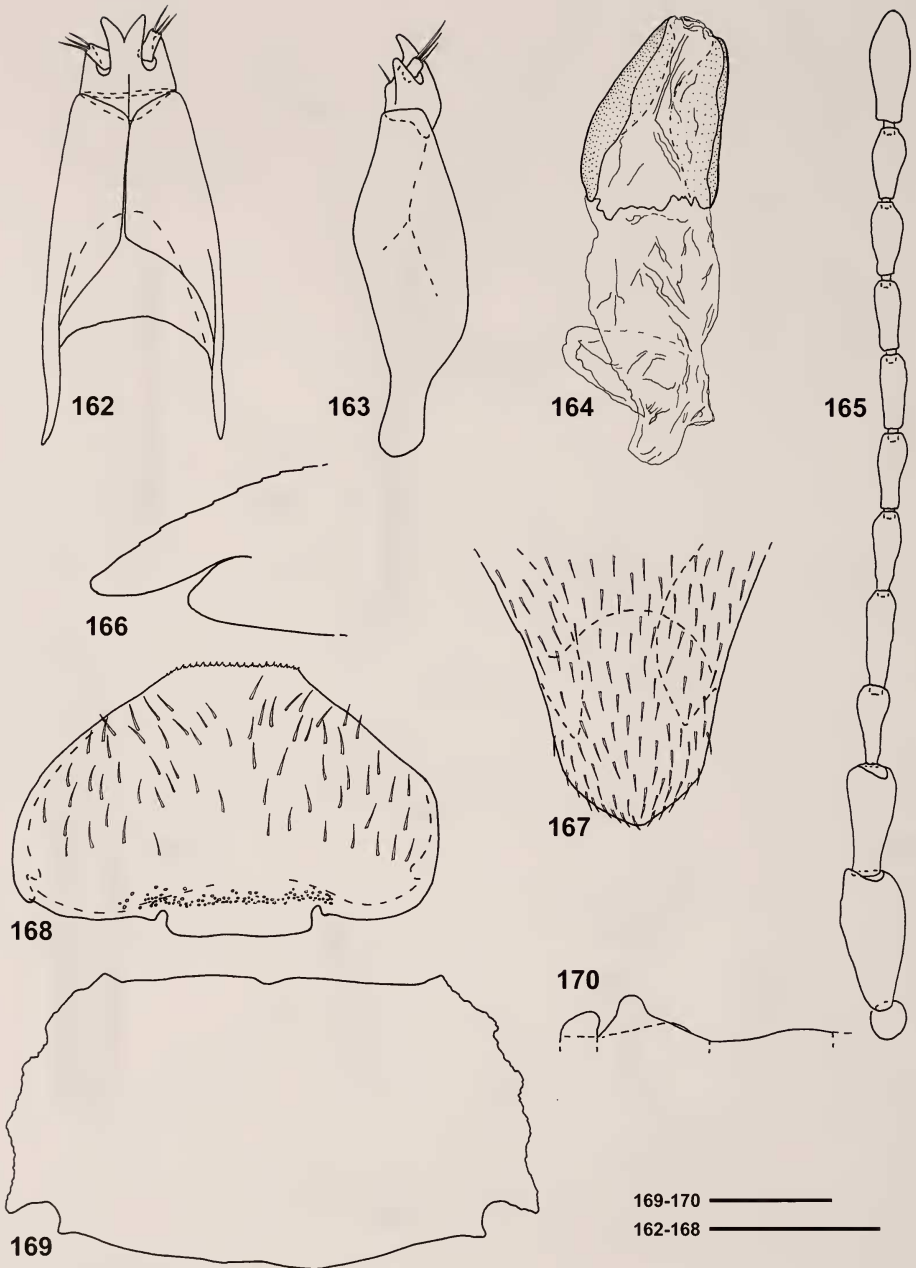
FIGS 148-153

Megarthus ogloblini Bruch, male; mesotibia (148); metatibia (149); apex of abdominal tergite VIII in lateral (150) and dorsal (151) views; mesotrochanter and mesofemur (152); metatrochanter and metafemur (153). Scale bar = 0.2 mm.



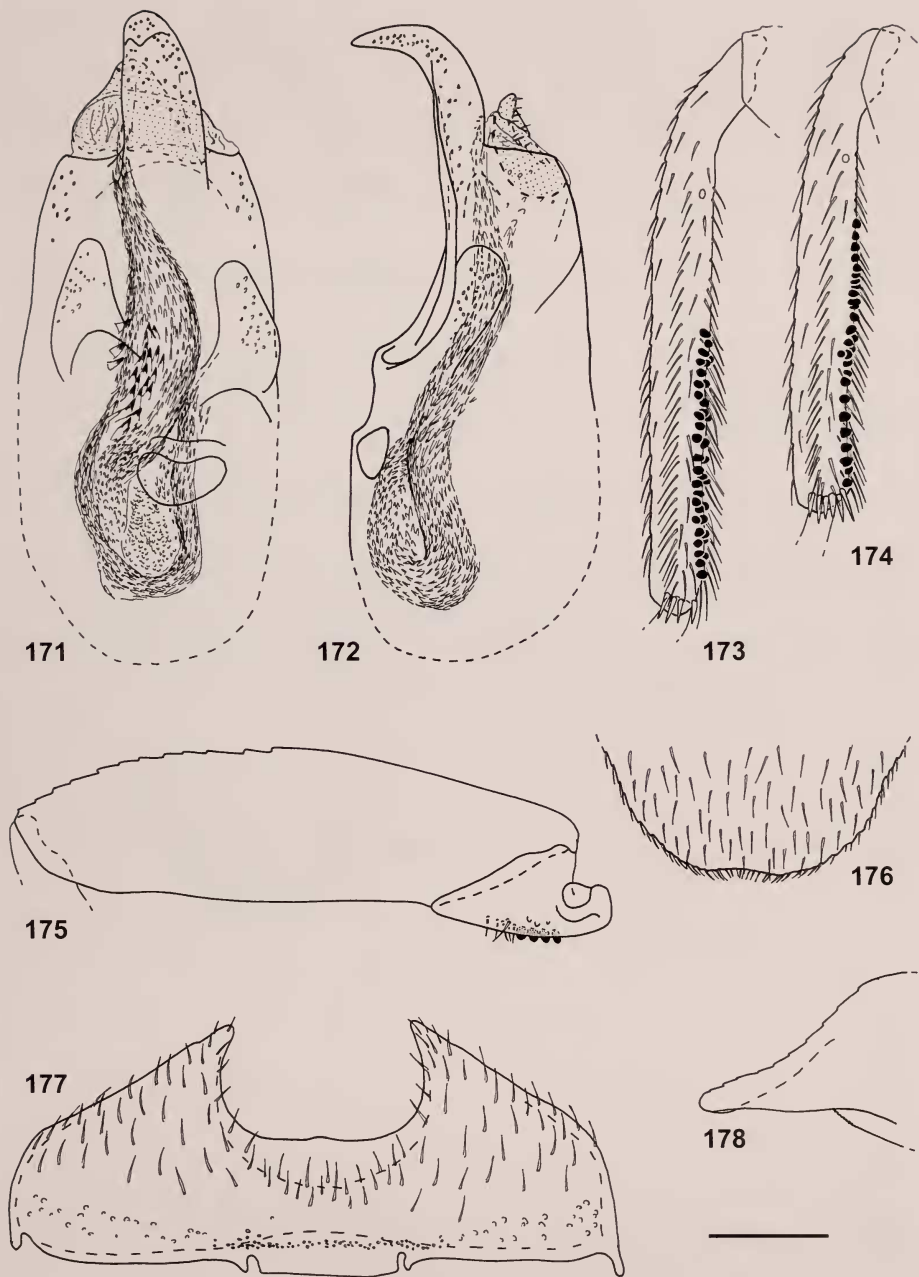
FIGS 154-161

Megarthus solitarius Sharp, male; aedeagus in ventral (154) and lateral (155) views; apex of abdominal tergite VIII in dorsal (156) and lateral (157) views; mesotrochanter and mesofemur (158); mesotibia (159); abdominal sternite VIII in ventral (160) and lateral (161) views. Scale bar = 0.2 mm.



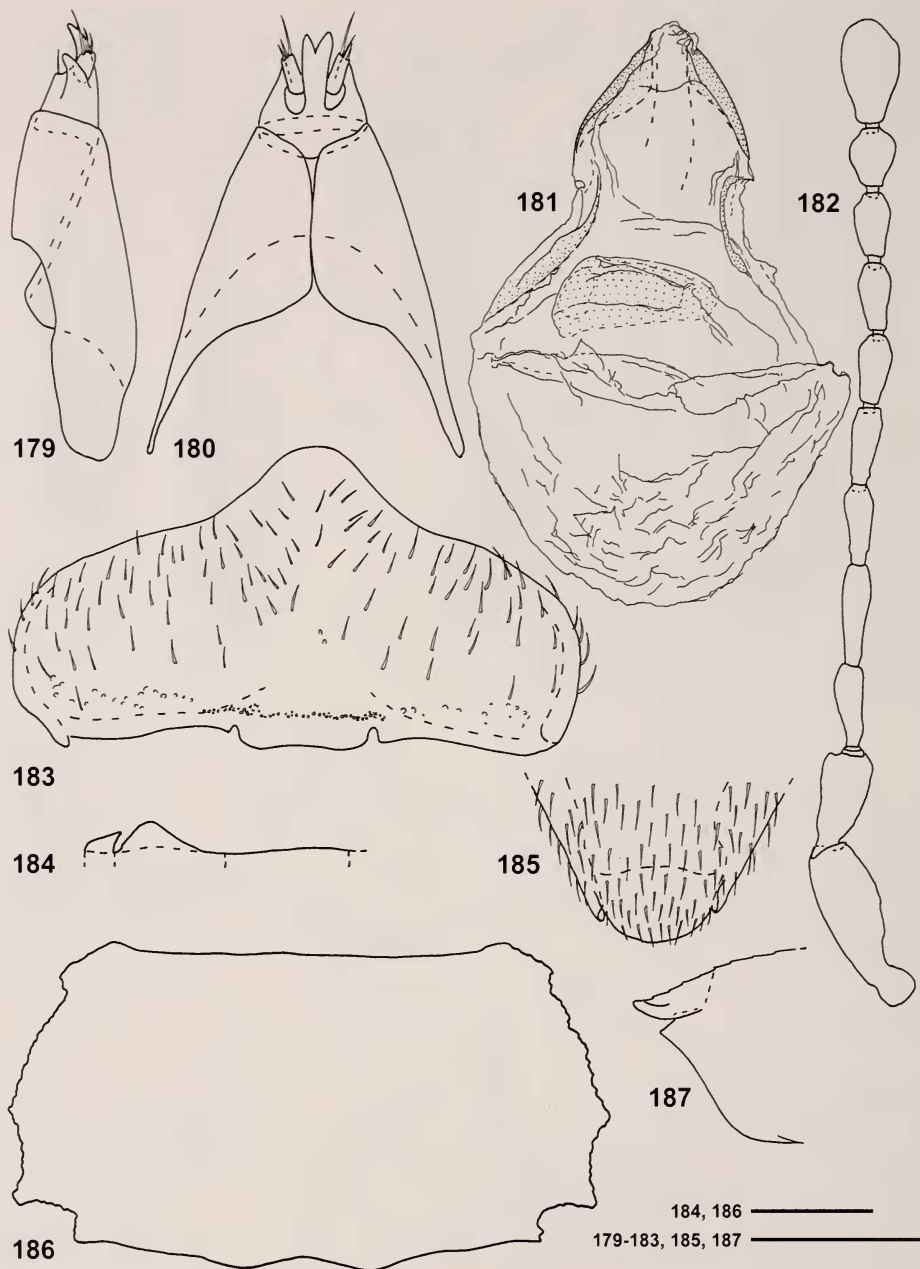
FIGS 162-170

Megarthus solitarius Sharp; female, genital segments, sternites in dorsal (162) and lateral (163) views, and tergites in ventral view (164); antenna (165); female, apex of abdominal tergite VIII in lateral (166) and dorsal (167) views; female, abdominal sternite VIII in ventral view (168); pronotum (169); medial area of abdominal sternites II-IV (left to right, upside down) in lateral view (170). Scale bars = 0.2 mm.



FIGS 171-178

Megarthus zunilensis Sharp, male; aedeagus in ventral (171) and lateral (172) views; metatibia (173); mesotibia (174); mesotrochanter and mesofemur (175); apex of abdominal tergite VIII in dorsal (176) and lateral (178) views; abdominal sternite VIII in ventral view (177). Scale bar = 0.2 mm.



FIGS 179-187

Megarthus zunilensis Sharp: female, genital segments, sternites in lateral (179) and dorsal (180) views, and tergites in ventral view (181); antenna (182); female, abdominal sternite VIII in ventral view (183); medial area of abdominal sternites II-IV (left to right, upside down) in lateral view (184); female, apex of abdominal tergite VIII in dorsal (185) and lateral (187) views; pronotum (186). Scale bars = 0.2 mm.

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